0030790

SEP 07 1993

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 600824

2. To: (Receiving Organization) Environmental Restoration Engineering	3. From: (Originating Organization) Environmental Restoration Engineering	4. Related EDT No.: NA
5. Proj./Prog./Dept./Div.: Environmental	6. Cog. Engr.: JM Frain	7. Purchase Order No.:
8. Originator Remarks: Procedures submitted for approval and release		9. Equip./Component No.:
		10. System/Bldg./Facility:
11. Receiver Remarks:		12. Major Assm. Dwg. No.:
		13. Permit/Permit Application No.:
		14. Required Response Date:

SEP 1993 RECEIVED EDMC

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-TC-004		0	100 Area Excavation Treatability Test Procedures	3Q	1/2	1	

16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1/2	1	Cog.Eng. JM Frain	JMF	9/2/93	H6-04	EPIC (2)		EDMC (1)	H6-08	3	
1/2	1	Cog. Mgr. for GC Henckel		9/2/93	H6-04	IRA (2)			H4-17	3	
1/2	1	QA GS Corrigan		9-3-93	H4-16	Central Files (2)			L8-04	3	
		Safety									
		Env.									
3		OU Coordinator JM Ayres		9/2/93	H6-02						
3		FTL DB Blumenkranz	D Blumenkranz	9/2/93	H6-04						

18.	19.	20.	21. DOE APPROVAL (if required)
JM Frain JMF 9/2/93 Signature of EDT Originator Date	for JG Woolard 9/2/93 Authorized Representative for Receiving Organization Date	for GC Henckel 9/2/93 Cognizant/Project Engineer's Manager Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

BD-7400-172-2 (07/91) GEF097

BD-7400-172-1 (07/91)

9413201.1490

INSTRUCTIONS FOR COMPLETION OF THE ENGINEERING DATA TRANSMITTAL

(USE BLACK INK OR TYPE)

BLOCK	TITLE	
(1)*	EDT	• Pre-assigned EDT number.
(2)	To: (Receiving Organization)	• Enter the individual's name, title of the organization, or entity (e.g., Distribution) that the EDT is being transmitted to.
(3)	From: (Originating Organization)	• Enter the title of the organization originating and transmitting the EDT.
(4)	Related EDT No.	• Enter EDT numbers which relate to the data being transmitted.
(5)*	Proj./Prog./Dept./Div.	• Enter the Project/Program/Department/Division title or Project/Program acronym or Project Number, Work Order Number or Organization Code.
(6)*	Cognizant Engineer	• Enter the name of the individual identified as being responsible for coordinating disposition of the EDT.
(7)	Purchase Order No.	• Enter related Purchase Order (P.O.) Number, if available.
(8)*	Originator Remarks	• Enter special or additional comments concerning transmittal, or "Key" retrieval words may be entered.
(9)	Equipment/Component No.	• Enter equipment/component number of affected item, if appropriate.
(10)	System/Bldg./Facility	• Enter appropriate system, building or facility number, if appropriate.
(11)	Receiver Remarks	• Enter special or additional comments concerning transmittal.
(12)	Major Assm. Dwg. No.	• Enter applicable drawing number of major assembly, if appropriate.
(13)	Permit/Permit Application No.	• Enter applicable permit or permit application number, if appropriate.
(14)	Required Response Date	• Enter the date a response is required from individuals identified in Block 17 (Signature/Distribution).
(15)*	Data Transmitted	
	(A)* Item Number	• Enter sequential number, beginning with 1, of the information listed on EDT.
	(B)* Document/Drawing No.	• Enter the unique identification number assigned to the document or drawing being transmitted.
	(C)* Sheet No.	• Enter the sheet number of the information being transmitted. If no sheet number, leave blank.
	(D)* Rev. No.	• Enter the revision number of the information being transmitted. If no revision number, leave blank.
	(E) Title or Description of Data Transmitted	• Enter the title of the document or drawing or a brief description of the subject if no title is identified.
	(F)* Impact Level	• Enter the appropriate Impact Level (Block 15). Also, indicate the appropriate approvals for each item listed, i.e., SQ, ESQ, etc. Use NA for non-engineering documents.
	(G) Reason for Transmittal	• Enter the appropriate code to identify the purpose of the data transmittal (see Block 16).
	(H) Originator Disposition	• Enter the appropriate disposition code (see Block 16).
	(I) Receiver Disposition	• Enter the appropriate disposition code (see Block 16).
(16)	Key	• Number codes used in completion of Blocks 15 (G), (H), and (I), and 17 (G), (H) (Signature/Distribution).
(17)	Signature/Distribution	
	(G) Reason	• Enter the code of the reason for transmittal (Block 16).
	(H) Disposition	• Enter the code for the disposition (Block 16).
	(J) Name	• Enter the signature of the individual completing the Disposition 17 (H) and the Transmittal.
	(K)* Signature	• Obtain appropriate signature(s).
	(L)* Date	• Enter date signature is obtained.
	(M)* MSIN	• Enter MSIN. Note: If Distribution Sheet is used, show entire distribution (including that indicated on Page 1 of the EDT) on the Distribution Sheet.
(18)	Signature of EDT Originator	• Enter the signature and date of the individual originating the EDT (entered prior to transmittal to Receiving Organization). If the EDT originator is the cognizant engineer, sign both Blocks 17 and 18.
(19)	Authorized Representative for Receiving Organization	• Enter the signature and date of the individual identified by the Receiving Organization as authorized to approve disposition of the EDT and acceptance of the data transmitted, as applicable.
(20)*	Cognizant Manager	• Enter the signature and date of the cognizant manager. (This signature is authorization for release.)
(21)*	DOE Approval	• Enter DOE approval (if required) by letter number and indicate DOE action.

*Asterisk denote the required minimum items check by Configuration Documentation prior to release; these are the minimum release requirements.

BD-7400-172-1R (07/91)

SUPPORTING DOCUMENT

SUPPORTING DOCUMENT	1. Total Pages 80

2. Title	3. Number	4. Rev No.
100 Area Excavation Treatability Test Procedures	WHC-SD-EN-TC-004	0

5. Key Words	6. Author
100-FR-1 Operable Unit, 100-DR-1 Operable Unit, Radiological characterization, Dust control	Name: for D. Blumenkranz/J. Frain
APPROVED FOR	Signature
	Organization/Charge Code 81351/PE75C

7. Abstract

PUBLIC RELEASE
7/15/93 D. Soltes

WHC, *100 Area Excavation Treatability Test Procedures*, WHC-SD-EN-TC-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

8. ~~PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed.~~

~~PATENT STATUS - This document copy, since it is transmitted in advance of patent clearance, is made available in confidence solely for use in performance of work under contracts with the U.S. Department of Energy. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above before patent approval for such release or use has been secured, upon request, from the Patent Counsel, U.S. Department of Energy Field Office, Richland, WA.~~

9. Impact Level 3Q

10. RELEASE STAMP

OFFICIAL RELEASE (11)
BY WHC
DATE SEP 07 1993
Station #12

9413201.1492

A-6400-073 (11/91) (EF) WEF124

THIS PAGE INTENTIONALLY
LEFT BLANK

J.S.

Date Received: 7-15-93 DS

INFORMATION RELEASE REQUEST

Reference: WHC-CM-3-4

Complete for all Types of Release

Purpose		ID Number (include revision, volume, etc.)
[] Speech or Presentation	[] Reference	WHC-SD-EN-TC-004, Rev. 0
[] Full Paper (Check only one suffix)	[X] Technical Report	List attachments.
[] Summary	[] Thesis or Dissertation	
[] Abstract	[] Manual	
[] Visual Aid	[] Brochure/Flier	Date Release Required
[] Speakers Bureau	[] Software/Database	July 15, 1993
[] Poster Session	[] Controlled Document	
[] Videotape	[] Other	

Title: 100 Area Excavation Test Procedures

Unclassified Category UC- N/A

Impact Level 3Q

New or novel (patentable) subject matter? [X] No [] Yes
If "Yes", has disclosure been submitted by WHC or other company?
[] No [] Yes Disclosure No(s).

Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions?
[X] No [] Yes (Identify)

Copyrights? [X] No [] Yes
If "Yes", has written permission been granted?
[] No [] Yes (Attach Permission)

Trademarks?
[X] No [] Yes (Identify)

Complete for Speech or Presentation

Title of Conference or Meeting
NA

Group or Society Sponsoring

Date(s) of Conference or Meeting

City/State

Will proceedings be published? [] Yes [] No
Will material be handed out? [] Yes [] No

Title of Journal
N/A

CHECKLIST FOR SIGNATORIES

Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval Name (printed)	Signature	Date
Classification/Unclassified Controlled Nuclear Information	[]	[X]			
Patent - General Counsel	[X]	[]	BD Williamson	BD Williamson	7/13/93
Legal - General Counsel	[X]	[]	BD Williamson	BD Williamson	7/13/93
Applied Technology/Export Controlled Information or International Program	[]	[X]			
WHC Program/Project	[]	[X]			
Communications	[]	[X]			
RL Program/Project	[X]	[]	E. Goller	Review not req'd J.S.	7/14/93
Publication Services	[X]	[]	L. Hermann	L. Hermann	7/14/93
Other Program/Project	[]	[X]			

Information conforms to all applicable requirements. The above information is certified to be correct.

	Yes	No
References Available to Intended Audience	[X]	[]
Transmit to DOE-HQ/Office of Scientific and Technical Information	[X]	[]

Author/Requestor (Printed/Signature) Date
J. M. Frain JMF 7/13/93

Intended Audience
[] Internal [] Sponsor [X] External

Responsible Manager (Printed/Signature) Date
G. C. Henckel GC Henckel 7/13/93

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP

Stamp is required before release. Release is contingent upon resolution of mandatory comments.

APPROVED FOR RELEASE DS 7-15-93

Date Cancelled

Date Disapproved

BD-7600-062 (08/91) WEF074

Part 1

9413201.1493

THIS PAGE INTENTIONALLY
LEFT BLANK

CONTENTS

FIGURES:

CONTENTS (cont.)

TABLES:

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This document describes the procedures required for the successful implementation of the 100 Area Excavation Treatability Test. This test has been outlined in the *100 Area Excavation Treatability Test Plan* (DOE-RL 1993). The test plan has been reviewed by the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the public. All working procedures are to be performed in compliance with the *WHC Radiological Control Manual*, WHC-CM-1-6 (WHC 1993), and the *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7 (WHC 1988). The table below describes applicable environmental investigations instructions (EII) found in WHC-CM-7-7.

Table 1. Applicable Environmental Investigations Instructions.

Title/Subject	EII
Hazardous Waste Site Entry Requirements	1.1
Instruction Change Authorizations	1.4
Field Logbooks	1.5
Indoctrination, Training and Qualification	1.7
Preparation of Hazardous Waste Operations Permits	2.1
Calibration and Control of Monitoring Instruments	3.2
Control of CERCLA and Other Past Practice Investigation Derived Waste	4.3
Control and Storage of Radioactive Materials and Equipment	4.4
Chain of Custody	5.1
Soil and Sediment Sampling	5.2
Field Cleaning and/or Decontamination of Equipment	5.4
Sample Packaging and Shipping	5.11
Air Quality Sampling of Ambient and Downwind Air at Waste Sites	5.12

1.2 BACKGROUND

1.2.1 Purpose

Treatability studies are primary components of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) remedial investigation/feasibility study (RI/FS) process, providing critical performance and cost information to evaluate and select remedial alternatives at hazardous waste sites. The purpose of this treatability test is twofold: to obtain a correlation between radiological field surveys and laboratory measurements and to test a variety of dust suppression methods.

Completion of the field activities for the 100 Area Excavation Treatability Test by November 30, 1993, will satisfy the treatability study milestone M-15-05B, established in the Hanford Federal Facility Agreement Consent Order change control form number M-15-92-11, dated December 3, 1992.

The 100 Area Excavation Treatability Test will involve the excavation of contaminated soil from the 116-F-4 waste site (100-F Area pluto crib). This crib lies in the 100-FR-1 operable unit, approximately 120 ft southwest of the 105-F reactor building (see Figure 1). The 116-F-4 pluto crib is a 10- by 10- by 10-ft timber structure, filled with sand or gravel, located approximately 8 ft below grade. It received approximately 1,057 gal of cooling water from individual process tubes contaminated as a result of fuel cladding failures. Water contaminated with an estimated 280 Ci of fission products was discharged to this crib during its operating period from 1950 to 1952 (Dorian and Richards 1978). After use, the crib was covered with a layer of soil. For this test, it is assumed that contaminated soil occupies a volume of 20 by 20 by 25 ft deep.

1.2.2 Test Objectives

Refer to the test plan (DOE-RL 1993) for specific objectives related to this test. A summary of these objectives is provided below.

- Determine the optimum operating parameters for the radiological screening equipment.
- Determine the degree of correlation between the radiological screening results and laboratory results.
- Determine the extent and nature of contamination in 116-F-4.
- Determine the most effective method of dust suppression.

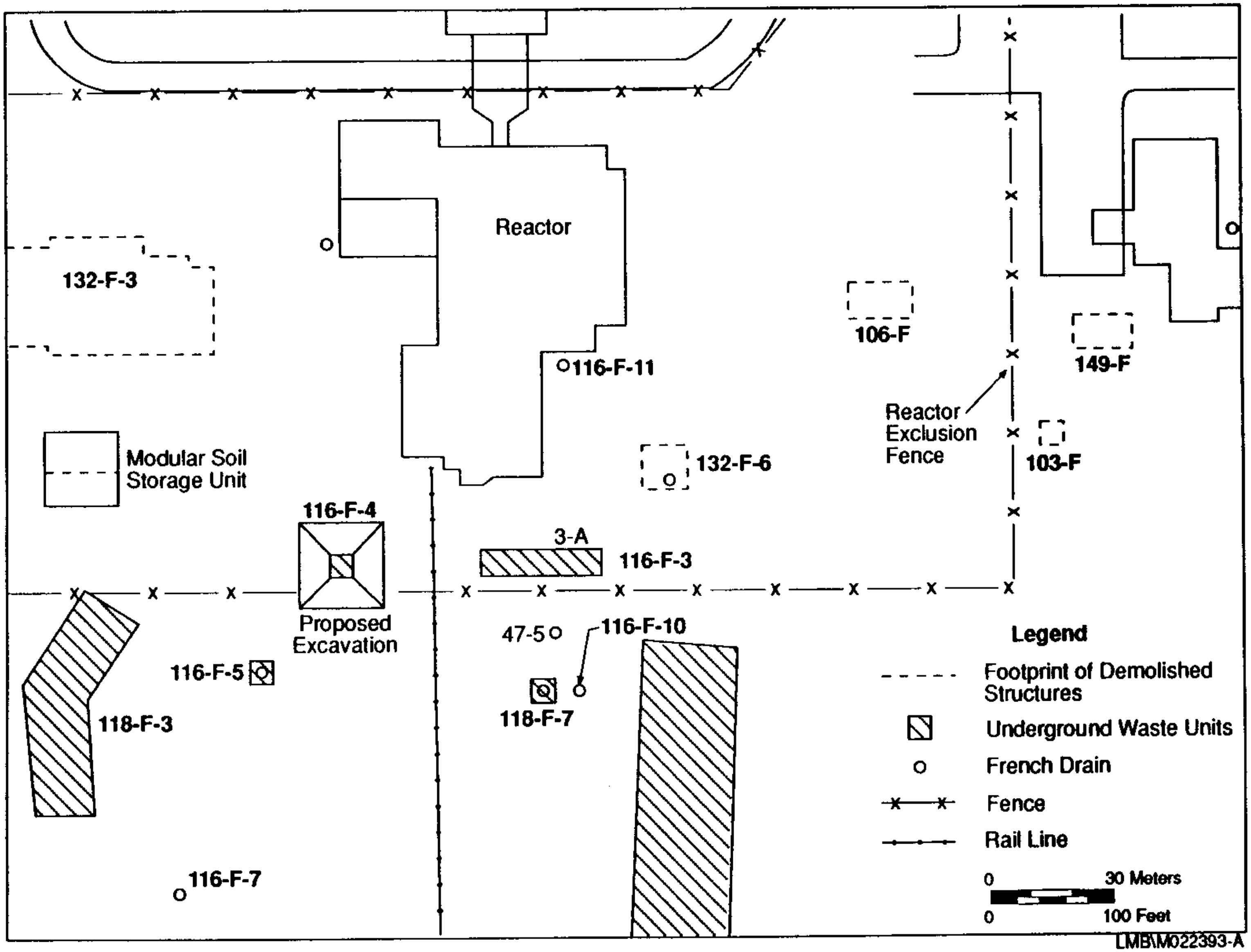


Figure 1. Location of the 116-F-4 Pluto Crib.

1.2.3 Preliminary Site Characterization

In February 1993, split-spoon soil samples were taken from a borehole drilled into 116-F-4 as part of the 100-FR-1 characterization. The borehole was located adjacent to the crib riser. Based on expected crib construction, it is assumed that the borehole was located at the center of the crib. Data taken from the 100-FR-1 vadose borehole drilling have been used to develop Table 2.

Table 2. 116-F-4 Vadose Borehole Data: Picocuries per Gram vs. Depth.

Depth range (ft)	Alpha (pCi/g)	Beta (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Am-241 (pCi/g)	Sr-90 (pCi/g)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)
0-2	4.5	20	< det	0.15	0.043	5.2	0	3.5	0	0
5-7	14	440	0.15	12	1.4	160	0.14	340	3.1	0.3
9.4-11.4	96	4900	1.1	130	12	1500	0.34	1800	16	0
13-15	6.1	1400	0.43	35	3.9	570	0	920	8.6	0.83
19-21	5.4	14	0.011	0.027	0.053	0.24	0	0.72	0	0
25-27	3.2	12	0	0.009	< det	0.03	0	0	0	0

2.0 FIELD ACTIVITIES

2.1 HEALTH AND SAFETY

The guidance for ensuring worker health and safety shall be provided in a site-specific health and safety plan [e.g., hazardous waste operations permit (HWOP)] as described in EII 2.1, "Preparation of Site Specific Health and Safety Plans" (WHC 1988). Radiological hazards and controls are detailed in the Radiation Work Permits (RWP).

As the primary means of protecting the health and safety of field personnel, all individuals who enter the controlled zone shall have received training to be qualified as a Hazardous Waste Worker as outlined in EII 1.1, "Hazardous Waste Site Entry Requirements." In addition, all workers will be required to attend an F-Area Facility Orientation class.

Safety-related documents and this procedure shall be reviewed by field personnel prior to commencement of work. Compliance with these documents is mandatory. A pre-job safety meeting and regular field-safety "tailgate" meetings shall be held to review safety considerations and identify any potential hazards not previously noted.

Should field conditions arise that warrant a change in either the HWOP or the RWP, the Site Safety Officer and the Health Physics Supervisor (respectively) may authorize a field changes to the documents with concurrence from the Health and Safety Officer.

2.2 EQUIPMENT

Due to the magnitude of the test, an extensive variety of equipment will be required. The lists presented in Appendix A are designed to aid personnel in the preparation for conducting the 100 Area Excavation Treatability Test.

2.3 EXCAVATION AND FIELD ACTIVITIES

2.3.1 Sloping and Shoring

All excavations on the Hanford Site must comply with the Washington Administrative Code (WAC) 296-155. Soil on the Hanford Site is classified as type "C" soil (WAC 296-155-66401) and an excavation side slope of 1.5 horizontal to 1 vertical will be required if personnel enter the excavated area. A plan figure of the excavation is shown in Figure 2. This slope will require certification from a state registered Professional Engineer at depths equal to or greater than 20 ft. The total depth of the excavation will not exceed 25 ft. Should benching be required to support personnel and/or equipment, a slope of 1.5 horizontal to 1 vertical must be maintained between benches and/or the excavation bottom. Benching in Type "C" soil is required to be designed by a registered professional engineer. Trenching will not be performed; therefore, shoring will not be necessary during any phase of operations.

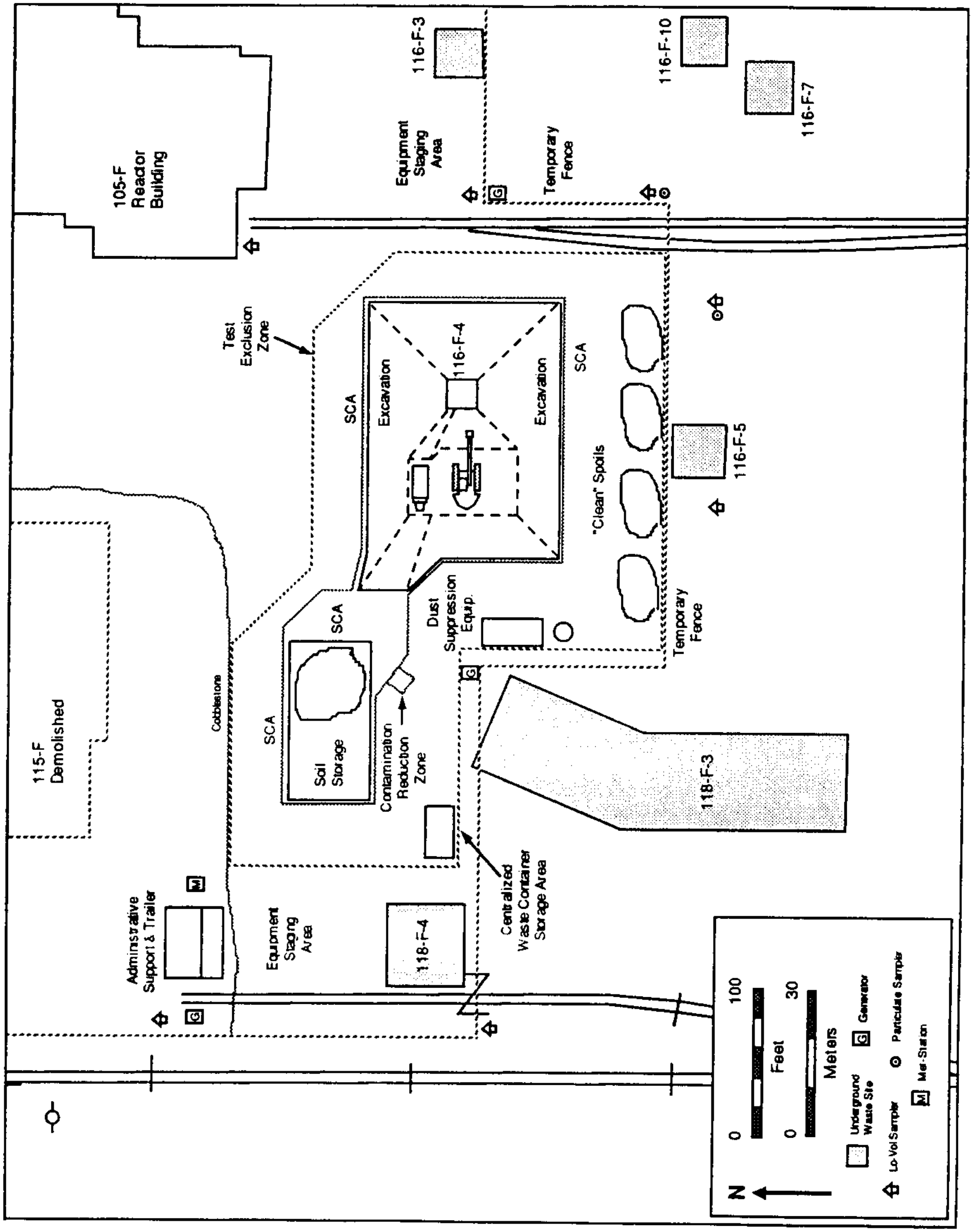
2.3.2 Site Setup

Prior to commencing work, the site will be staged with an exclusion zone, contamination reduction zone, and a support zone. Site visitors shall be prohibited from all zones at the site unless they meet the requirements listed within the HWOP, this procedure and are escorted by the field team leader, Site Safety Officer, or excavation supervisor.

2.3.2.1 Exclusion Zone. The exclusion zone shall contain the excavation, the clean soil staging area, the contaminated soil storage unit, the heavy equipment, and the other equipment to be used within the excavation (essential sampling equipment, field instrumentation). Only essential personnel shall be permitted within the exclusion zone. For radiological control purposes, portions of this area will also be posted as a surface contamination area (SCA), in accordance with the RWP.

Any open excavation shall be barricaded except at times when the excavation is ongoing. The contaminated soil in the soil storage unit will be covered during times of inactivity. The contaminated storage unit is a pre-manufactured, 90- by 40-ft unit (TerraStor, a trademark of ModuTank, Inc.) The unit has been pre-assembled by the excavation site. While the test is being conducted, a temporary cover of 10-mil plastic sheeting will be used to cover the expanding contaminated soil pile. Upon completion of all excavation activities, the contaminated soil will be covered with a 30-mil-thick, reinforced liner.

Figure 2. Plan View of Excavation and Work Area.



2.3.2.2 Contamination Reduction Zone. The contamination reduction zone shall contain all provisions necessary to facilitate decontamination. For radiological control purposes, this area will also be posted as a radiologically controlled area and will include the clean spoil piles. Only essential personnel shall be permitted within the contamination reduction zone.

2.3.2.3 Support Zone. The support zone shall contain all other supplies, equipment, and nonessential personnel.

2.3.3 Excavation

The excavation is being conducted to facilitate dust control testing (Appendix B) and field screening for radionuclides (Appendix C). This section is written to detail the actual excavation. The appendixes must be referred to for details on the testing procedures.

The excavation will be completed in a series of 2-ft-deep lifts as shown in Figure 3. At the start of the test, one lift per day will be screened and sampled (if time allows, a second lift will be initiated). As the excavation deepens, the number of lifts sampled per day is expected to decline as sloping and dust suppression become more involved. The following list outlines the steps necessary for site excavation and field screening.

1. Excavate a 2-ft lift, slope excavation, and segregate soil, conducting radiological surveillance (with hand-held instruments) as directed by the Health Physics Technician (HPT) or field team leader. If large pieces of timer are uncovered, segregate from the soil, if possible, package, and place in waste storage area.

2. Throughout the test, conduct dust-suppression activities on the spoils and in the excavation as directed by the dust control procedures provided in Appendix B.

   The field team leader may authorize additional dust suppression as required by site conditions. Dust control while moving the soil to the contaminated soil storage area is very important. Unloading the truck also requires special considerations: place the misting nozzles on the truck or spray the truck during unloading if required.

   Table 3 briefly details dust suppression techniques to be tested during the excavation.

3. Shut down excavation. Stabilize the excavation with a surfactant or crusting agent, as directed by the field team leader. If Step 4 is to be completed before the end of the shift, do not add the crusting agents/surfactants until screening is complete.

Lift	Width (ft) at Top of Lift	Contaminated Soil (yd^3)	Total Contam. Soil Volume After Lift is Excavated	Uncontaminated Soil (yd^3)	Total Uncontam. Soil Volume After Lift is Excavated
1	95	0	0	668	668
2	89	30	30	587	1255
3	83	30	60	510	1765
4	77	30	90	439	2204
5	71	30	120	373	2577
6	65	30	150	313	2890
7	59	30	180	258	3148
8	53	30	210	208	3356
9	47	30	240	164	3520
10	41	30	270	125	3645
11	35	0	270	91	3736
12	26	0	270	50	3786
Bottom	20	0	270	0	3786

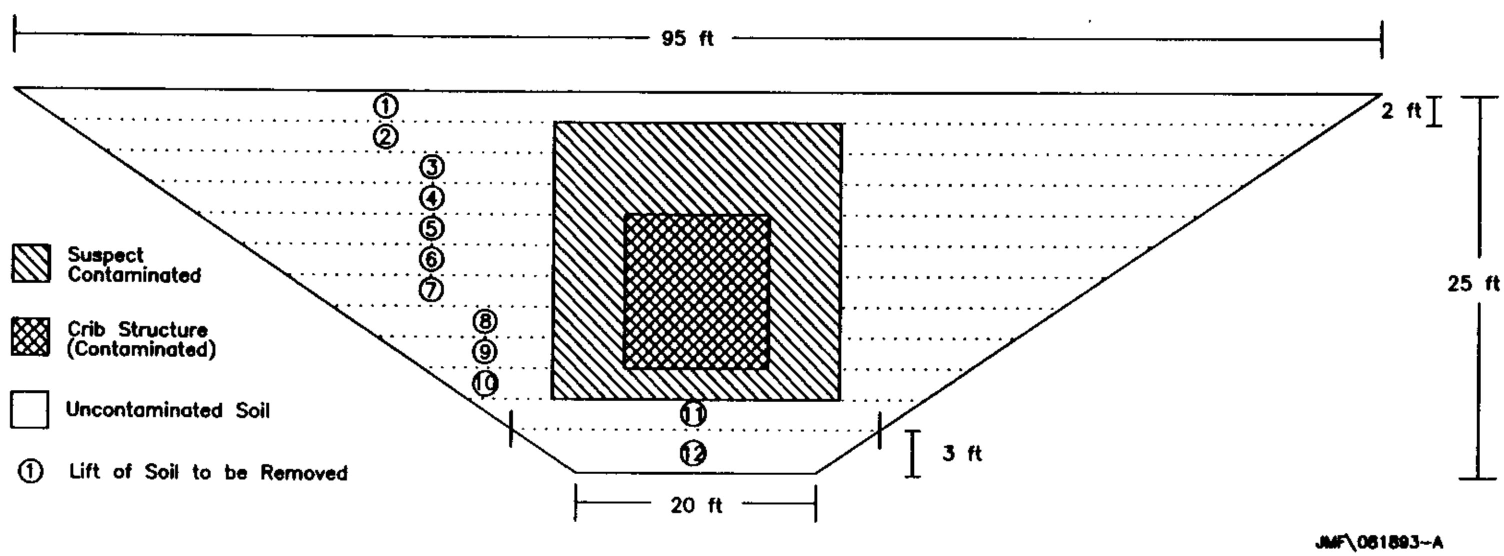


Figure 3. Section Through Excavation.

Table 3. Dust Control Test Phases.

Phase	Depth (ft)	Lift#
Phase 1: No Water Addition[a]	1-4	1-2
Phase 2: Water Spray	4-16	3-8
Phase 3: Water with Additives	16-25	8-12
Phase 4: Crusting Agents	1-25	All

[a]The surface soils will be surveyed for radiological contamination prior to and during excavation activities. If levels indicate contamination greater than background, or if indicated by the Health Physics Technician, Phase 1 will be discontinued and water sprays will be used to prevent the spread of contamination. The tests of "no water addition" will be conducted after the completion of excavation in the clean spoil piles.

4. After an HPT surveys each sampling point with an Eberline R03B Ion Chamber and a portable alpha meter (see Figure 4 for sampling points), lower sampling and screening equipment (if needed, break through the crusting agent to reveal soil surface). Sample and survey lift (as described in Appendix C). Determine extent of contamination.

5. Remove sampling and radiological screening equipment and conduct radiological surveillance as required to release equipment.

6. Remove soil excavated from the radiologically contaminated areas (as determined by Steps 4 and 5) to the TerraStor. Either dump material from the dump truck into the TerraStor or place soil into the unit with a backhoe. In any instance, do not drive over the liner without a minimum of 1 ft cover of soil. The soil shall be higher in the center than on the sides to allow precipitation runoff.

   Store clean soil in the exclusion zone, south of the excavation (location of the clean spoil piles may be modified depending on site conditions).

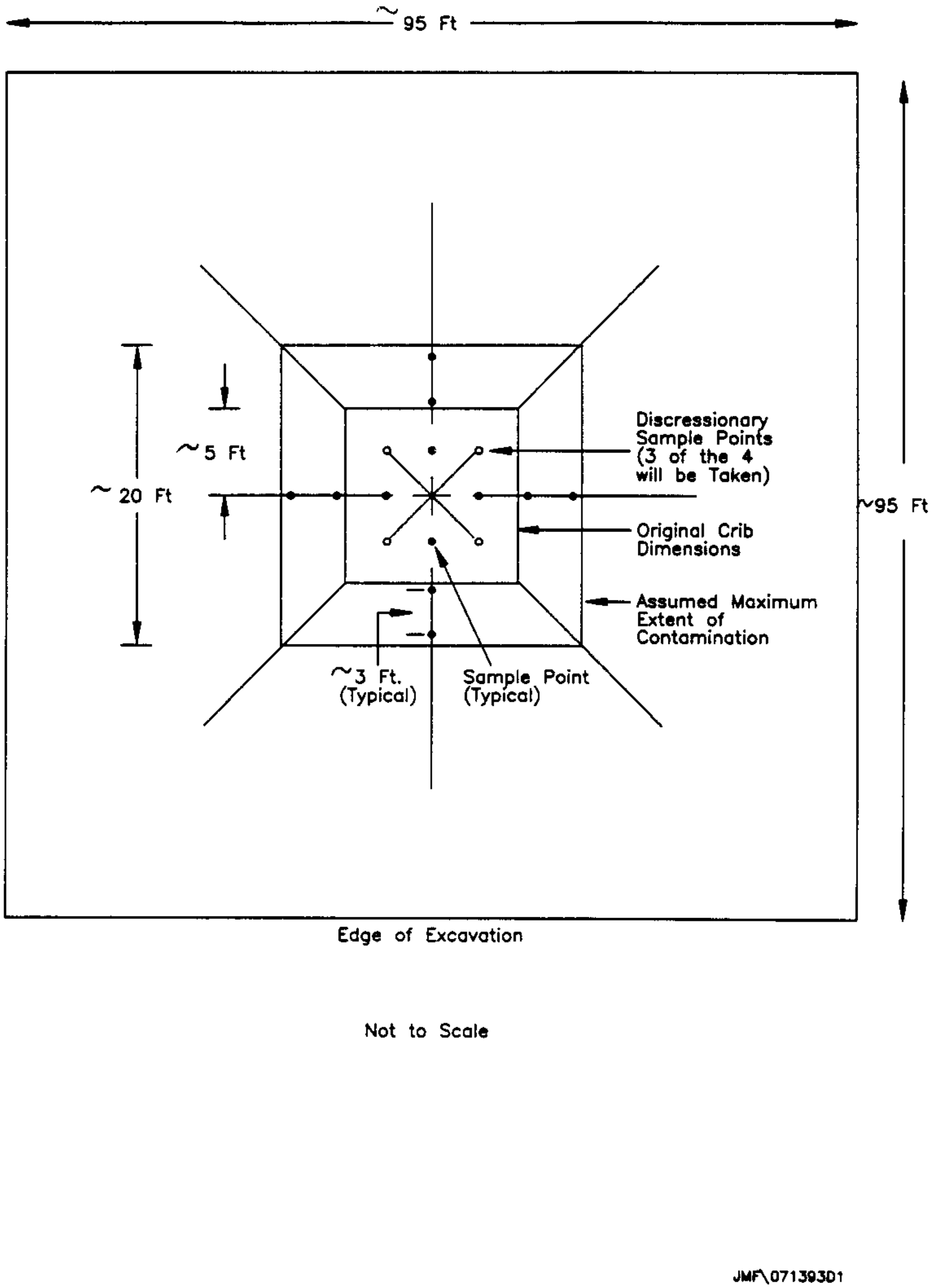
7. Prepare for excavation of next lift.

8. Repeat steps 1 through 7 until excavation reaches a depth of 25 ft.

9. At the completion of the excavation, take verification samples from bottom and sides of excavation per the guidance of Appendix C. Place a minimum of 2 ft of soil cover (from the clean spoil piles) in the bottom of the excavation as a cover.

   If the bottom of the excavation is still contaminated, reassess the situation with DOE and regulators.

Figure 4. Location of Soil Sampling Points.



9413201.1505

10. Survey the four corners of the excavation. Verify slopes.

11. When the verification sample results are returned from the laboratory, backfill the excavation pending discussions with DOE and the regulators. Backfill the excavation by replacing the soil into the excavation in lifts and compacting in 18-in. lifts with the backhoe bucket. Obtain fill to compensate for the contaminated soil volume from Pit 18, which is just south of F Area.

2.3.4 Particulate Monitoring

Three types of particulate monitoring are scheduled to be collected to help assess the effectiveness of the dust suppression techniques tested. The systems to be used are low-volume air samplers to measure total dust concentration, a real-time sampler to conduct total dust measurements on a more frequent basis, and personal air samplers to measure respirable dust emanating from the excavation.

A total of seven low-volume air samplers will be used during this test to monitor particulate concentrations. The location of the air samplers will be adjusted in the field based on the wind direction data collected from the onsite meteorological station. A site map will be completed at the beginning of the test and each time the samplers are adjusted to record the sampler positions.

In addition, real-time total dust air monitoring will be conducted. One real-time air sampler is available which requires 30 seconds per reading. Readings will be taken at 20 locations every 2 h, designated in a specific sequence. Prior to the start of real-time air monitoring, the current wind direction will be determined. The locations of the actual monitoring points will be determined by the sample technician so that the samples are obtained both upwind and downwind of the area/dust source of interest. During the work shift, the real-time air monitoring will be performed at least every 2 h.

Personal air samplers for total dust monitoring will be worn by the backhoe operators and the sample technicians working in the exclusion zone. New filters will be installed at the start of each work day and collected at the end of the work day as directed by Hanford Environmental Health Foundation approved procedures.

Table 4 indicates the air monitoring schedule. Figure 2 illustrates the tentatively chosen air sample locations.

2.4 CONTAMINATION PREVENTION AND DECONTAMINATION

The primary contaminants of concern are radionuclides. Specific decontamination guidance and special instructions are listed in the RWP. WHC-CM-1-6 (WHC 1993) and the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH 1985) also provide guidance on decontamination practices. The following is meant to provide an overview of field decontamination procedures and contamination prevention measures.

Table 4. Air Monitoring Schedule.

Activity	Working hours (7:30-4:00)	Down time (evenings, weekends)
Collect/replace low-volume sampler filters	Start of shift End of shift	Once on weekends
Real-time monitoring (20 locations)	Every 2 h	1, 2, and 3 h after completion of excavation
Install/remove personal air samplers	Install at start of shift Remove at end of shift	None

2.4.1 Equipment

Successful contamination prevention measures will reduce the likelihood of contamination leaving the exclusion zone and/or the likelihood of creating regulated equipment. The following suggests the minimum contamination prevention measures that should be taken to ensure equipment remains deregulated. The list below does not preclude the HPT from the responsibility of informing onsite personnel of the risk involved with taking equipment into the exclusion zone. The HPT should advise onsite personnel of the proper measures to minimize equipment contamination potential. Dust control equipment (water sprays and surfactants) will be available at all times to mitigate spread of contaminated soil.

- Wrap instruments in tape/plastic when possible
- Take only what is needed
- Avoid contact with contaminated or suspect media
- Avoid the use of equipment with lots of "nooks and crannies"
- HPT will monitor decontamination activities.

Field decontamination of heavy equipment will be accomplished by the application of high-pressure water and/or steam. Decontamination of the backhoe bucket will take place over the soil waste storage unit or the contaminated area of the excavation. Other field decontamination shall be conducted as required by EII 5.4 and WHC-CM-1-6 (WHC 1993).

2.4.2 Personnel Decontamination

Decontamination is the process of removing or neutralizing contaminants that have accumulated on personnel and equipment. To facilitate decontamination, a contamination reduction zone will be maintained at the site. Health Physics personnel have the primary responsibility for conducting operations in the contamination reduction zone. Specific procedures for establishing and maintaining a contamination reduction zone are provided in WHC-CM-1-6. Further guidance is available in the RWP. The following procedure is meant to provide field personnel with direction with regards to exiting the exclusion zone. The list below does not preclude the HPT from the responsibility of informing onsite personnel of the proper clothing removal procedures on an as-needed basis. The HPT will not serve as an in-field trainer for undress procedures.

Before stepping to the inner step-off pad:

- remove exposed tape
- remove rubber workshoes
- remove outer gloves
- remove hood from front to rear
- remove outer coverall, inside out, touching inside only
- remove respiratory protection, direct mask away from others
- remove tape from inner coveralls and sleeves
- remove each outer shoe cover, stepping on inner step-off pad as each cover is removed.

Before stepping to the outer step-off pad:

- remove inner coverall, inside out, touching inside only
- remove inner rubber gloves
- remove tape from inner shoe cover
- remove each inner shoe cover, place the shoe on outer step-off pad
- remove cotton glove liners
- commence whole body survey.

2.5 WASTE MANAGEMENT

Specific guidelines with regards to waste management are contained in Appendix D.

3.0 SITE RESTORATION

Upon completion of the test, and upon receipt of samples verifying that all contaminated soil has been removed, the excavation will be returned to grade level. Soil that is identified during the test as noncontaminated will be returned to the excavation as backfill. Any additional soil required will be taken from a soil borrow site (pit 18, approximately 1/2 mi south-south east of F Reactor).

Details on backfilling are provided in Section 2.3.3.

After completion of the test, contaminated soil will remain in the contaminated soil storage unit (TerraStor) on the test site until needed for future processing. The storage unit shall remain covered and be posted appropriately. A monitoring program will be put into effect to ensure the storage unit retains its integrity.

All equipment and structures will be moved from the site, and any altered fencing will be returned to its original location. Waste drums containing "unknown" waste may be left onsite with the soil storage unit until receiving the proper waste designation. Waste will be handled as discussed in Appendix D and the regulator-approved waste control plan.

4.0 REPORTING REQUIREMENTS

During the test, field logbooks shall be maintained by the field team leader, sampler, and a Special Analytical Studies technician. Information recorded within these logbooks will be used to supplement laboratory results and other existing documentation used in the production of the final report discussed in the test plan (DOE-RL 1993).

4.1 DATA CORRELATION

4.1.1 Field Screening

The sampling objectives for the field/laboratory radionuclide analysis correlation are as follows:

- Obtain representative measurements and samples of the soil in the test site
- Determine in situ soil radionuclide concentrations
- Derive a correlation between cone penetrometer data, field measurements, and laboratory analyses.

To assist the radiological technician in tracking samples and relating them to radiological screening results, Table 5 may be of use.

In addition to the radiological screening, a total of four samples of soil will be field screened for metals and, in particular, Cr(VI). If the field screening samples indicate the presence of chrome, or other metals greater than background, samples will be sent to an offsite laboratory for verification and comparison with laboratory results.

4.1.2 Dust Suppression Effectiveness

The sampling objectives for the dust control test are as follows:

- Obtain representative samples and determine concentrations of airborne particulates in and around the excavation site
- Demonstrate the effectiveness of commercial dust control agents on Hanford soil during remediation
- Demonstrate long term effectiveness of commercial crusting agents on noncontaminated Hanford soil.

To assist air sampling personnel in data gathering, Table 6 may be used, or the air monitoring results can be recorded directly into the field logbook.

Table 5. Sample Information and Radionuclide Concentrations.

HEIS #	Location	Time	^{241}Am	^{152}Eu	^{154}Eu	^{155}Eu	^{60}Co	^{137}Cs	$^{239/240}Pu$	^{90}Sr	^{99}Tc	^{235}U	^{238}U
Performance (Detection) Limits (pCi/g)			20	3	3	100	1	3	75	13	1750	15	50
Sampler:									Date:				
Analyst:									Lift Depth:				
Comments:													

Table 6. Real-Time Air Sampling Results.

Location	Time	Wind Speed	Wind Direction	Results
Sampler:		Date:	Lift Depth:	
Comments:				

5.0 REFERENCES

DOE-RL, 1993, *100 Area Excavation Treatability Test Plan*, DOE/RL-93-04, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Dorian, J. J. and V. R. Richards, 1978, *Radiological Characterization of the Retired 100 Areas*, UNI-946, United Nuclear Industries, Inc., Richland, Washington.

NIOSH, 1985, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institute for Occupational Safety and Health (NIOSH) et al., U.S. Department of Health and Human Services, Washington, D.C.

WAC 296-155, *Excavation, Trenching, and Shoring*, Washington Administrative Code 296-155, Part N, 1992, Olympia, Washington

WHC, 1988, *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington

WHC, 1993, *WHC Radiological Control Manual*, WHC-CM-1-6, Westinghouse Hanford Company, Richland, Washington

APPENDIX A

EQUIPMENT LIST

APPENDIX A

EQUIPMENT LIST

HEALTH AND SAFETY EQUIPMENT

The following represents a brief summary of the equipment required to conduct the test activities in a safe fashion. The list below is not considered all inclusive, and additional items may be required as determined by the Site Safety Officer and Health Physics Technician.

- HWOP and RWP posted at site
- GM and PAM
- protective clothing (white and blue coveralls)
- gloves, hardhats, steel-toed footwear, earplugs, safety glasses
- eye wash, first aid kit, bug bite kit
- wet and dry bulb thermometers, globe thermometer
- drinking water
- wash water
- heavy duct tape, masking tape
- respiratory protection equipment, masks
- air conditioned change facilities
- cellular phone
- training records

ADMINISTRATIVE EQUIPMENT

The following represents a brief summary of the equipment required to conduct the administrative activities. The list below is not considered all inclusive, and additional items may be required as determined by the field team leader (FTL).

- Field Logbook
- calculator
- RWP, HWOP, procedures, sample plan
- working documentation
- pens, sharpies, pencils
- HEIS numbers
- manufactures' operator's manuals for the appropriate equipment
- air conditioned administrative trailer
- cellular phone
- training records
- generator and fuel

EXCAVATION EQUIPMENT

The following represents a brief summary of the equipment required to conduct the excavation activities. The list below is not considered all inclusive and additional items may be required as determined by the supervisor of the excavation activities.

- tractor, backhoe, trucks
- barricades
- waste drums, labels, and associated packaging
- measuring tape
- shovels

RADIOLOGICAL SCREENING EQUIPMENT

The following represents a brief summary of the equipment required to conduct the radiological screening activities. The list below is not considered all inclusive, and additional items may be required as determined by the cognizant engineer/scientist. This list does not include equipment under the control and/or supervision of health physics personnel.

- ATV (all terrain vehicle) and towing assembly
- detector assembly
- soil standards for detector calibration
- detection hardware and software
- 16x16x4-in. NaI(Tl) gamma detector (Geometrics/Harshaw), primarily for ^{137}Cs and gross gamma
- 3x3-in. NaI(Tl) gamma detector (Bicron), primarily for ^{137}Cs and gross gamma
- 35% efficiency hyperpure germanium gamma detector (Princeton Gamma Tech) for all gamma-emitting radionuclides including ^{241}Am when not much ^{137}Cs is present
- 10-in. plastic scintillating beta detector (out for bid vendor not selected yet), will detect all beta emitters, but primarily ^{90}Sr
- 24x24-in. plastic fiber scintillating detector (PNL), will detect all beta emitters, but primarily ^{90}Sr. NOTE: The size is not finalized.

SAMPLING EQUIPMENT

The following represents a brief summary of the equipment required to conduct the sampling activities. The list below is not considered all inclusive, and additional items may be required as determined by the sample support personnel.

- SAF (Sample Analysis Form), bottles, preservatives
- trowels, spoons, rubber gloves
- sample location equipment
- field decontamination equipment
- plastic sealer bags/evidence tape
- ice chest with wet or "blue" ice
- absorbent (vermiculite) for shipping
- pens, sharpies, pencils
- Sample Field Logbook
- data documentation forms (COCs, RCRs, etc.)
- measuring tape
- 47-mm filter paper
- filter paper envelopes
- low-volume air sampler
- real-time air monitor
- personnel air samplers and filter papers

DUST SUPPRESSION EQUIPMENT

The following represents a brief summary of the equipment required to conduct the dust suppression and air monitoring activities. The list below is not considered all inclusive, and additional items may be required as determined by the cognizant engineer/scientist.

- water truck and water
- additives and crusting agents and associated equipment
- 4- to 8-pint-capacity measuring device
- flow meter and calibration equipment
- meteorological/weather station
- plastic sealer bags/evidence tape
- Contamination Control Unit--to be supplied and operated by Idaho National Engineering Laboratory.

APPENDIX B

DUST CONTROL PROCEDURES

1.0 TEST OVERVIEW

1.1 TEST OBJECTIVES

The dust suppression test program is designed to assess the effectiveness of various dust control techniques and agents. This appendix provides details on the dust suppression test program. Excavation details have been provided in the body of the procedures.

1.2 TEST OUTLINE

The test program has been separated into four phases of field testing as shown below in Table BT-1. The first three phases are to evaluate methods of dust control during the excavation operation and the fourth phase is to evaluate crusting agents during operational down-times.

Table BT-1. Dust Control Test Phases.

Phase	Depth (ft)	Lift#
Phase 1: No Water Addition[a]	1-4	1-2
Phase 2: Water Spray	4-16	3-8
Phase 3: Water with Additives	16-25	8-12
Phase 4: Crusting Agents	1-25	All

[a]The surface soils will be surveyed for radiological contamination prior to and during excavation activities. If levels indicate contamination greater than background, or if indicated by the Health Physics personnel, Phase 1 will be discontinued and water sprays will be used to prevent the spread of contamination. If phase 1 is discontinued, the tests of "no water addition" will be conducted after the completion of excavation in the clean spoil piles or on the clean edges of the excavation.

2.0 TEST PROCEDURES

2.1 PRE-TEST

One to two weeks prior to the beginning of the excavation operation, the air samplers will be set up to monitor ambient conditions prior to disturbing the site. Sample papers will be collected at the end of each week and analyzed as discussed in Appendix C, "Sampling and Analysis Plan."

2.2 NO WATER ADDITION

No water addition for dust suppression will take place over the first 2 days of the excavation. The objective of this test program is to define a baseline dust generation for excavation and a baseline soil moisture content. If site conditions prevent this phase of the test during the first few days, the "no water" tests will be conducted on the clean spoil piles after the excavation is complete, or on the clean edges of the excavation.

2.3 WATER SPRAYS

Water sprays for dust suppression will be performed between the third through eighth day of the excavation. This phase will be divided into two parts. The first will assess the effectiveness of the standard method of water spraying for dust control. The second will evaluate the DRYFOG Ultrasonic Misting System, manufactured by Sonics Inc., which is contained in the Contaminated Control Unit (CCU) obtained from Idaho National Engineering Laboratory (INEL).

2.3.1 Standard Water Sprays

Water spraying will be performed using portable, standard fog-spray nozzles that are typically used in construction. Spraying will occur at the excavation cut surfaces, contaminated soil storage unit, and at the stockpile areas. Water spraying of the potential dust generation locations will be performed on an as-needed basis, with the objective of using the minimum quantity of water required to maintain the dust levels below allowable levels, as measured by real-time dust monitoring and visual observations.

During the water spraying, the volume of water utilized each hour for dust suppression, the number of times each area was sprayed, the duration of each spraying episode, and visual observations of the effectiveness of the spraying shall be recorded on the Dust Control Data Sheet (Figure BF-1).

As each lift is excavated, and the newly exposed surface is sprayed for dust suppression, the samples for soil moisture content determination will be collected for testing. Similarly, the soil moisture content samples will be collected in the stockpile areas. Dust monitoring will be continuously performed.

The following general procedure will be used:

1. Ensure tank is filled with water.

2. Ensure nozzle is attached to hose. Record the type of nozzle that is attached.

3. Record beginning water meter reading and time on data sheet.

4. Begin spraying down area, noting time, location and approximate size of area to be sprayed on data sheet. Attempt to spray just enough water to adequately contain dust. Do not over saturate the area.

DUST CONTROL DATA SHEET

Lift	Time On	Time Off	Agent Used	Dilution	Application Rate/Flow	Approximate Area Covered	Effectiveness (1 thru 5)*	General Comments and Observations

Name:	Date:
Additional Comments:	

* 1=Ineffective, 2=Partial or Temporary Dust Suppression, 3=As Good As Water, 4=Effective, Better Than Water Alone, 5=Very Effective (rate against water use under identical circumstances)

Figure BF-1. Dust Control Data Sheet.

5. After spraying is completed, note water meter reading and time on the data sheet.

6. Collect soil moisture content sample from area which was sprayed.

7. Repeat steps 3-5 for each water spray application.

2.3.2 Misting System

The misting system which is part of the CCU will be evaluated during the 6 to 8 days of testing. This system utilizes a specially designed nozzle to mix air and water to create a fine cone of mist. The CCU contains a 300-gal tank for water supply, a compressor to supply air to the misting system, and a pump to provide water pressure at the misting heads. The trailer is designed to operate up to six heads, either individually or in tandem. The misting heads can be placed in strategic positions to provide dust control for digging operations.

The misting system heads will be positioned at strategic locations over the dig area that does not interfere with ongoing operations. The misting system will be operated per the instructions for operation of the CCU.

During the misting operation, the volume utilized each hour for dust suppression, the duration of each spraying episode, and visual observations of the effectiveness of the spraying shall be recorded on the Dust Control Data Sheet.

As each lift is excavated, and the newly exposed surface is sprayed for dust suppression, the samples for soil moisture content determination will be collected. Similarly, the soil moisture content samples will be collected in the stockpile areas. Dust monitoring will be performed.

2.4 WATER WITH ADDITIVES

This phase of the test will be performed during the ninth to twelfth day of the excavation. This test program will replicate the work of the Phase 2 program; however, the effectiveness of the addition of surfactant will be assessed.

Two surfactants will be tested, for two consecutive days each. The two surfactant chosen are EMC Squared H2O+ (manufactured by Soil Stabilization Products Co. Inc.), and MSDC (manufactured by Pico Chemical Corporation).

The water/surfactant mixture will be prepared according to Table BT-2 and will be applied using portable, standard fog spray nozzles. Spraying of the potential dust generation locations will be performed on an as-needed basis, with the objective of using the minimum quantity of water required to maintain the dust levels below allowable levels, as measured by real-time dust monitoring and visual observations.

Table BT-2. Additive Dilution Factors.

<table>
<tr><th rowspan="2">Surfactant[a]</th><th colspan="3">Dilution-Per 1,000 gal[a]</th></tr>
<tr><th>8th Day</th><th>9th Day</th><td rowspan="4">12th Day Optional Mixture determined by field team leader</td></tr>
<tr><td>MSDC</td><td>4 pints/1,000 gal</td><td>8 pints/1,000 gal</td></tr>
<tr><td></td><td>10th Day</td><td>11th Day</td></tr>
<tr><td>EMC Squared H_2O</td><td>4 pints/1,000 gal</td><td>8 pints/1,000 gal</td></tr>
</table>

[a]The brand of surfactant and the dilution rates may be altered at the discretion of the field team leader, based on either field conditions, product availability, or new information about other products. Actual product used and dilutions rates will be recorded in the field logbook.

During the water/additive spraying, the volume utilized each hour for dust suppression, the number of times each area was sprayed, the duration of each spraying episode, and visual observations of the effectiveness of the spraying shall be recorded on the Dust Control Data Sheet.

As each lift is excavated, and the newly exposed surface is sprayed for dust suppression, the samples for soil moisture content determination will be collected for testing. Similarly, the soil moisture content samples will be collected in the stockpile areas. Dust monitoring will be performed.

The following general procedure will be used.

1. Ensure tank is filled with the specified amount of water. Add appropriate amount of surfactant (see Table BT-2).

2. Ensure nozzle is attached to hose. Note type of nozzle being used.

3. Record beginning water meter reading on data sheet.

4. Begin spraying down area, noting time, location, and approximate size of area to be sprayed on data sheet. Attempt to spray just enough water to adequately contain dust. Do not over saturate the area.

5. After spraying is completed, note water meter reading and time on the data sheet.

6. Collect soil moisture sample from area that was sprayed.

7. Repeat steps 3-5 for each water/additive spray application.

Table BT-3. Crusting Agent Dilution and Application Guidelines.

Day of test	Crusting agent[a]	Dilution ratio[a]	Application rate (gal/yd^2)
1	Road Oyl	4:1	1
2		10:1	1
3		4:1	0.5
4		10:1	0.5
5	Lignosite	2.5:1	0.5
6		5:1	1
7		5:1	0.5
8		10:1	1
9	Soil Seal	30:1	2
10		40:1	2
11		30:1	0.5
12		40:1	0.5

[a]The brand of surfactant and the dilution rates may be altered at the discretion of the field team leader, based on either field conditions, product availability, or new information about other products. Actual product used and dilution rates will be kept in the field logbook.

2.5 PHASE 4: CRUSTING AGENTS

Crusting agents will be tested during the downtimes (overnight and weekends) of the program. Three crusting agents will be tested during the course of the test. The products chosen are Road Oyl (a registered trademark of Road Products Corp.), Lignosite (a registered trademark of Georgia-Pacific), and Soil Seal Concentrate (a registered trademark of the Soil Seal Corporation).

Each crusting agent will be tested for approximately 4 days, using the procedure described below.

At the end of the working day, final dust level measurements will be taken at the designated locations in the exclusion zone and the filter samples will be collected from the air totalizing samplers. Air samplers will be fitted with new filters to collect dust samples over the down period to the start of the new work day. Once the final dust measurements from active excavation have been obtained, the crusting agent will be mixed with water and applied. The CCU unit will be used to apply the crusting agent. The crusting agent solution will be applied to the cut surfaces in the excavation, staging area, contaminated soil and soil stockpile surfaces. Road Oyl cannot be used on the cut surfaces of excavation or on the contaminated soil, because it will

9413201.1527

not be compatible with soil washing. Another crusting agent will be applied in these areas at the direction of the field team leader.

If dust measurements or visual observations indicate that allowable dust levels are being exceeded onsite, additional crusting agent may be applied. The additional applications of crusting agent will be recorded.

Following application of the crusting agent solution, the soil moisture content will be measured at 10 locations in the excavation and at 2 locations in each of the soil stockpiles.

During the application of the crusting agent solution, accurate records will be kept for the volume of water applied, volume of crusting agent applied, number of applications, and time of application.

Crusting Agent Preparation: The amount of crusting agent required for each application will depend on the surface area, application rate, and dilution factor. The crusting agents will be applied to the cut surface, contaminated soil pile, and clean soil pile(s). The following guidelines are given for application rate and dilution factor. The field team leader will estimate the surface area and using the guidelines below will calculate the volumes of water and agent required.

If the excavation proceeds longer than planned, the above mixes can be varied based on observed results to optimize the preferred dust control agent. The field team leader will be responsible for identifying any additional mixes to be tested.

The following general procedure shall be used to apply the crusting agent.

1. Prior to applying crusting agent, ensure soil has been premoistened slightly.

2. Exchange air sampler filter papers noting time in the logbook.

3. Take real-time dust measurements.

4. Prepare the crusting agent per the guidelines above in the CCU.

   a. Empty the designated amount of crusting agent into the 300-gal supply tank (part of the CCU).

   b. Fill the supply tank with water.

   c. Pay out hose to the application area.

   d. Apply the crusting agent at the designated application rate per operating instructions of the CCU.

   NOTE: If large volumes of the crusting agent solution are required, mix the crusting agent in the water tank and connect the water tank hose to the CCU pump.

5. Note the time, volume used, air temperature, weather conditions, wind speed and direction. Also note any visual observations.

6. Repeat the above steps as needed.

APPENDIX C

SAMPLING AND ANALYSIS PLAN

1.0 SCOPE OF WORK

This sampling and analysis plan supports the 100 Area Excavation Treatability Test Plan (DOE-RL 1993a). It directs sampling activities related to cone penetrometer testing, radiological monitoring, chemical monitoring, and dust control monitoring.

2.0 BACKGROUND

2.1 PURPOSE

The purpose of this sampling plan is to layout the sampling procedures to be used to obtain correlation between radiological field surveys and laboratory measurements and to obtain air monitoring data to support an evaluation of dust suppression methods. Details on the excavation have been provided in the main body of the procedures.

2.2 SITE LOCATION

The Excavation Treatability Test will be conducted at the 100 Area F Reactor in support of the 100-HR-1 Treatability Test Milestone. The chosen waste site is the 116 F-4 Pluto Crib. Sampling will be conducted within the confines of a 20- by 20-ft excavation pit. The crib site is located within the 100-F Area reactor exclusion fence, approximately 120 ft southwest of the reactor building.

2.3 CHEMICALS OF CONCERN

According to historical records, this crib received radioactively contaminated reactor coolant from reactor process tubes with failed fuel elements. The discharge was aqueous, containing mixed fission products, sodium dichromate, sulfuric acid, and hydrazine. Residual hazardous materials are not expected in detectable concentrations in this crib, due to the very low initial chemical concentrations and volume of discharged wastewater. Table CT-1 provides data from the recent borehole sampling of the crib. Chemical data from the borehole did not indicate the presence of any chemicals greater than background levels. Table CT-2 lists the required performance levels for the test. These levels have been chosen as the detection levels necessary in the field to ensure that field screening can detect contamination at levels near cleanup standards. The levels were chosen based on tables provided in WHC-CM-7-5 at the time the test plan was written. Currently, the only standards available for release of radioactive soils are those listed in the Environmental Compliance Manual, WHC-CM-7-5 (WHC 1993). The chosen performance levels are sufficiently below these values.

Table CT-1. 116-F-4 Vadose Borehole Data: Picocuries per Gram vs. Depth.

Depth Range (ft)	Alpha (pCi/g)	Beta (pCi/g)	Pu-238 (pCi/g)	Pu-239/240 (pCi/g)	Am-241 (pCi/g)	Sr-90 (pCi/g)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)
0-2	4.5	20	<det	0.15	0.043	5.2	0	3.5	0	0
5-7	14	440	0.15	12	1.4	160	0.14	340	3.1	0.3
9.4-11.4	96	4900	1.1	130	12	1500	0.34	1800	16	0
13-15	6.1	1400	0.43	35	3.9	570	0	920	8.6	0.83
19-21	5.4	14	0.011	0.027	0.053	0.24	0	0.72	0	0
25-27	3.2	12	0	0.009	< det	0.03	0	0	0	0

Table CT-2. Performance Levels for the 116-F-4 Pluto Crib Excavation.

Radionuclide	Type of radiation	Allowable soil concentrations[a] (pCi/g)	Performance level (pCi/g)
$^{239/240}Pu$	Alpha, gamma	190	75
^{90}Sr	Beta	2800	13
^{152}Eu	Beta, gamma	15	3
^{154}Eu	Beta, gamma	14	3
^{137}Cs	Beta, gamma	30	3

[a]Accepted upper limit of radioactive material concentrations for soil [Environmental Compliance Manual, Table 6.2 (WHC 1993)].
Site volume is 23,000 ft^3.
Site mass is 1.6 x 10^9 g.

3.0 FIELD MONITORING AND SAMPLING ACTIVITIES

3.1 CONE PENETROMETER GAMMA SURVEYS

A cone penetrometer will be used to provide in situ gamma radiation measurements in the crib prior to excavation. Penetration testing will be conducted using a 1.75-in.-outside diameter rod, using a truck with a capability of at least 60,000 lb. The testing will be conducted to locate the center (or area with the greatest concentration of contaminants) of the 116-F-4 Pluto Crib. The radiation will be detected using a sodium-iodide scintillator. The scintillator will be calibrated prior to initial measurements. Records of the baseline calibration will be maintained by Applied Research Associates (ARA) personnel and submitted to the field team leader. Once the center point has been established, 12 additional points will be placed as shown in Figure CF-1 to establish a sampling grid. The sample locations will be placed 3 ft apart on two perpendicular lines that intersect at the center point of the crib. The center cone rod will be used as a benchmark to locate each of the sampling points during the excavation. The line of samples in the east-west direction shall be located parallel with the fence, which will provide easy reference for soil samplers during the excavation. It is estimated that up to five bores may be needed to locate the center point. These bores will not exceed 35 ft in depth. Of the 12 additional points, 6 may go to a depth of 35 to 40 ft to determine the maximum depth of contamination. The remaining six will not exceed 25 ft in depth. Depth of bore may be limited due to refusal of underground objects. If maximum depths do not reach 25 ft, as much data as possible will be collected from the shallow holes.

All casing, with the exception of the center casing, will be backpulled using a Westinghouse Hanford Company (WHC) supplied backhoe or a crane. The center casing will be used during the excavation to locate soil sample points to correlate with the cone penetrometer samples. The casing will be surveyed for radiological contamination and may be retained by WHC if found to be contaminated. Decontamination, storage, and disposal will be conducted according to EII 4.4 procedures as necessary (WHC 1988).

3.2 RADIATION SURVEYS AND SAMPLE COLLECTION

Survey and sampling locations for the radiological surveys have been based on a statistical approach developed in the test plan (DOE-RL 1993a). The survey and sampling pattern is shown in Figure CF-2. Exceptions to the plan may be made for observed discoloration, excessive moisture, high dose rate, obvious changes in the soil consistency, and other anomalies.

Field radiation detection using the test instruments will be performed by Special Analytical Studies scientists and technicians from the 222-S Analytical Laboratory. Surveys will be conducted using Sodium Iodide and High Purity Germanium detectors for gamma and two types of beta detectors.

Figure CF-1. Cone Penetrometer Sampling Points.

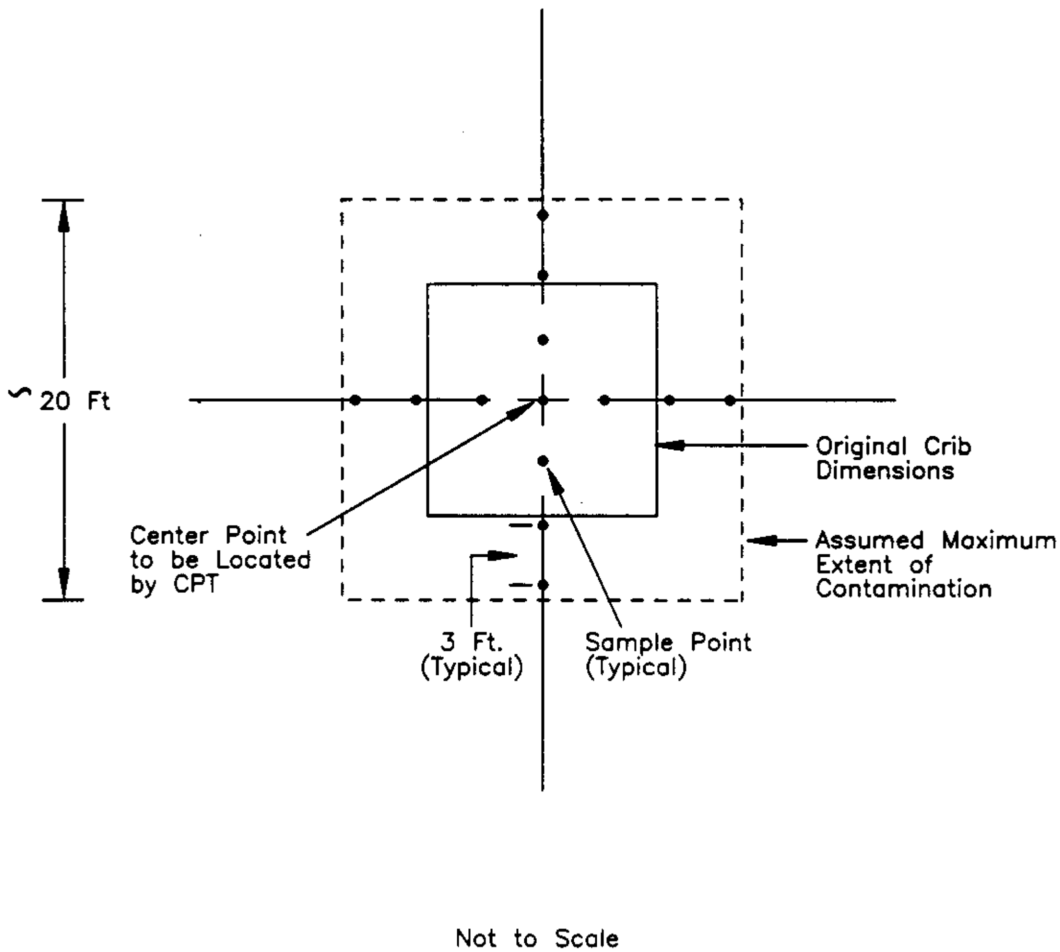
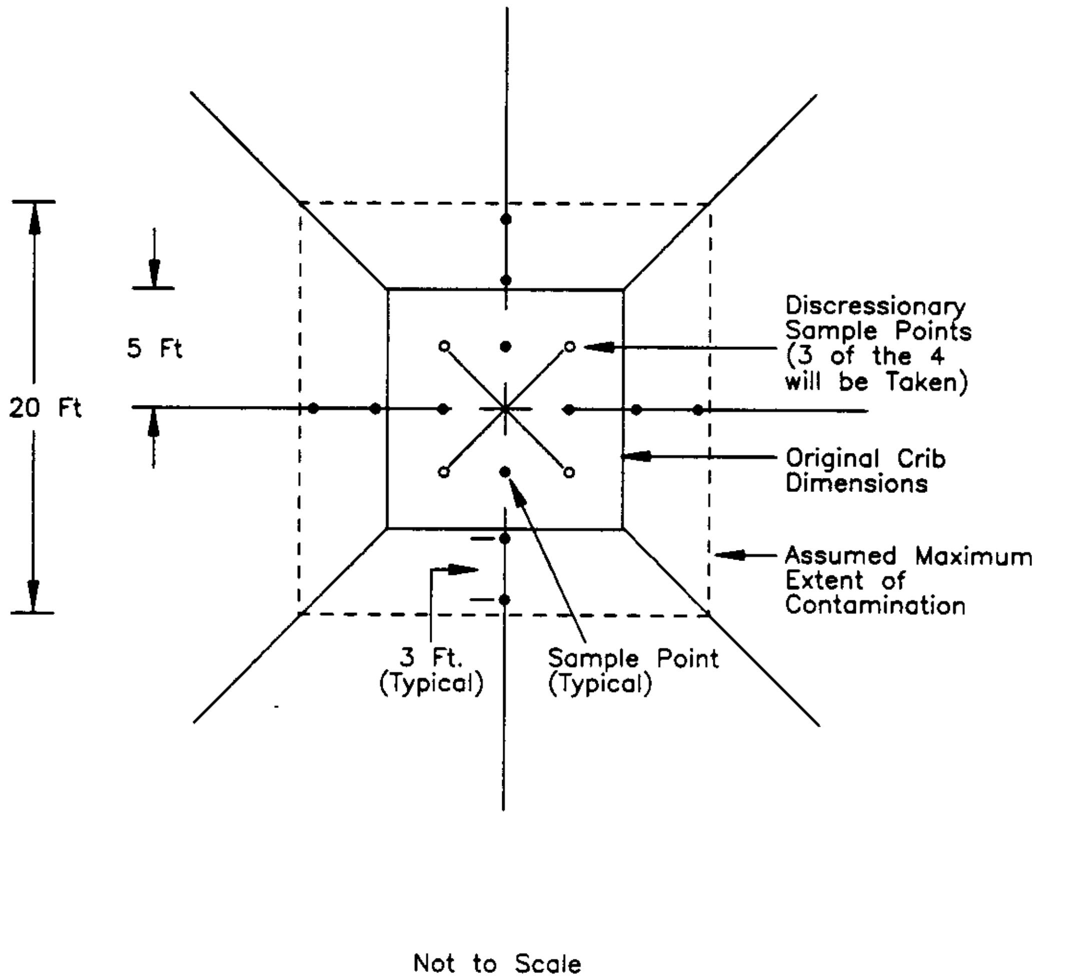


Figure CF-2. Radiological Screening Locations.



9413320.1536

The objective of this sampling effort is to collect radiological data from the soil samples to correlate with the field radiation surveys. This objective will be met by collecting the soil samples from the areas immediately underneath the radiation detectors as soon as the field surveys are completed. Samples will be identified with a Hanford Environmental Information System (HEIS) number that corresponds to the location, thereby linking the soil samples to the respective survey locations. Samples being sent to an offsite laboratory will be identified with HEIS numbers as discussed in Section 4.0. Number of samples to be collected is discussed in Section 3.2.2.

3.2.1 In Situ Assays

The excavation will be conducted by removing soil in 2-ft lifts. After each lift, the field team leader will direct the field surveys. Approximately 16 locations will be surveyed at each elevation. Immediately following each radiological survey, a corresponding soil sample will be collected at some of the locations. The Health Physics Technicians will also conduct a field survey of each location. Results of the surveys will be provide to the field team leader.

Techniques will be applied in the field so that minimum detectable radionuclide concentrations are at levels at least as low as Table CT-2. As a practical matter, detector counting may be terminated if any one isotope is found to exceed the limits of Table CT-2 by a factor of five, and all instruments are in agreement. At that point, the detectors may be moved to the next survey location. Conversely, the field team leader may elect to extend count times to obtain specific information for nonlimiting isotopes.

Special conditions may exist near foreign objects such as timbers, piping. or boulders. Planned surveys and sampling locations will be adjusted as necessary to avoid these underground objects. This will ensure that the relationship between field surveys and laboratory analyses are not skewed by abnormal concentrations of entrained contamination. Special surveys and sample collection may be conducted over timbers and other objects for specific object characterization. These decisions will be made by the field team leader. Added survey/sample sites shall be noted in the field logbook. Adjustments to the sampling plan are discussed in Section 7.0.

All instrumentation will be mounted on two carts that can be pulled as a trailer with an all terrain vehicle (ATV) or truck-mounted winch. One will be for computer equipment, called the instrumentation cart. The other will be for the detectors, called the detector cart. If feasible, all instrumentation and detectors will be placed on a single cart. A truck-mounted winch will be used to lift the trailers from the pit if ATV performance is inadequate.

The instrumentation cart will be connected electrically to the detector cart with coaxial signal cable. The instrumentation will consist of a personal computer-based multichannel analyzer with personal computer card-mounted analog to digital converters. This cart will also contain a line conditioner. Electrical power will be distributed from this conditioner to the computer and instrumentation cart.

The following detectors will be mounted on the detector cart:

- 16x16x4-in. NaI(Tl) gamma detector
- 3x3-in. NaI(Tl) gamma detector
- 35% efficiency hyperpure germanium gamma detector
- 10-in. plastic scintillating beta detector
- plastic fiber scintillating detector developed by Pacific Northwest Laboratory (PNL).

Some of these detectors may be positioned directly on the ground during surveys. The cart will also contain standard Nuclear Instrument Module (NIM) instrumentation. Lead will be used to collimate the gamma detectors and to shield them from unwanted background radiation. This cart will be built with large pneumatic wheels and is expected to weigh approximately 600 lb fully loaded.

3.2.1.1 Soil Standards and Instrument Calibration. Instrument calibration is performed by comparing the instrument response from the sample to that of the standard. Most standards will be made from National Institute of Standards and Technology (NIST) traceable materials when practical. Europium and natural activity standards will be made from noncertified material and assayed by the 222-S laboratory, which calibrates its detectors from NIST traceable materials.

3.2.1.1.1 Gamma-Ray Standards. The gamma-ray detectors are sensitive to a larger volume of soil than is realistic to make standards, so differences will be taken into account between the geometry of the standards and samples. It would be cost prohibitive to make a large volume standard for every isotope. Differences between the geometry of the standard and soil will be accounted for by a combination of the following three methods.

1. A 2-in.-thick large area standard will be counted. Then an equal thickness blank will be stacked on top and it will be re-counted. Then another blank will be placed on top and counted again. Then the spectra will be summed together to yield an equivalent spectra for a thick soil.

2. A 2-in.-thick small area standard of one isotope will be counted. Then a 2-in.-thick large area standard of the same isotope will also be counted. A ratio will be determined between the detector response from the small to the large area standard. This ratio will then be applied to other isotopes.

3. Calculations of the radiation flux at the detector will also be made for the geometry of standard geometry and the geometry of the soil. Flux calculations will be performed using the computer model Microshield, and verified with hand calculations. Flux calculations will be used to make minor adjustments between the standard and soil.

The concentration of transuranic radionuclides will be estimated from the quantity of ^{241}Am detected. The average ratio between ^{241}Am and plutonium in Table CT-1 will be used for this conversion.

Reported activity will be corrected for rocks. Rocks are not included when sampling soil for laboratory analysis, but are measured in situ. Activity is attached to surfaces, and the fine particles have far more surface area per unit weight than do rocks. Thus, the specific activity (pCi/g) is different for rocks and sand from the same soil. A 5-gal bucket of soil will be screened and weighed at each excavation lift to determine the weight percent fines. The reported activity will be the measured value divided by the weight percent fines.

3.2.1.1.2 Beta Detectors. The beta detectors will be calibrated directly against soil spiked with the isotopes of interest. The soil volumes will be large enough to cover the entire face of the detector and will be thick enough to behave like an infinitely thick sample.

Rocks will not be a problem because the measurement is just a surface measurement, and the rocks will be raked aside before making the measurement.

3.2.1.2 Data Storage and Reduction. Multichannel spectral data will be collected and stored from the output of the detectors. To minimize radiological exposure and personnel heat stress, data will be reduced in a post-acquisition fashion after collecting all the data associated with each excavation lift. It is expected that all data will be processed by the end of each work day.

NaI(Tl) spectra taken from higher activity regions containing clear and unobscured photopeaks will be reduced to radionuclide activity by comparing the net photopeak area to standards. Photo peak areas will be found using commercial analysis software. Spectra from lower activity regions of soil containing obscured photopeaks will be reduced from region of interest (ROI) counts to radionuclide activity by solving simultaneous equations using commercially available software. Both approaches require single isotope standards for all the major radioelements in the sample.

High Purity Germanium (HPGe) spectra will be reduced to radionuclide activity from net photopeak areas using commercially available software. An energy versus detector efficiency calibration curve will be developed from a single multiple energy standard. Isotope-specific standards will not be required.

The shape of the 10-in.-diameter plastic scintillator beta spectra will be used for isotope identification. Identification of either ^{99}Tc or ^{90}Sr will be made for those spectra that clearly match known spectra of those isotopes. No attempt will be made to quantify more than one isotope from each spectrum. Spectral data will be reduced to ^{90}Sr activity by summing the total counts in a broad high energy ROI and comparing to a ^{90}Sr standard. This ROI will be set above the energy of ^{137}Cs conversion electrons. In the unlikely event that pure ^{99}Tc is observed, the total counts in a broad low energy ROI will be compared to a ^{99}Tc standard. Technetium-99 results should be treated as semiquantitative, and the results should be used only for indication purposes.

Data from the PNL Large Area Beta detector will be reduced to ^{90}Sr activity based on the total number of beta events that are energetic enough to penetrate through three different layers of scintillating fibers. As the beta passes through each fiber it will cause it to scintillate. Quantification will be based on the total number events that are energetic enough to cause all three layers to scintillate simultaneously.

3.2.2 Laboratory Analysis

A total of 20 randomly selected samples with similar moisture contents are required to obtain a correlation between the radiological field screening and laboratory analysis. To obtain 20 samples with essentially the same moisture contents, 40 samples will be collected from the excavation to ensure achieving the adequate correlation. These samples shall be collected from the same location as the field screening measurements. The samples shall be randomly chosen from each lift. The field team leader and sample technicians will determine sample collection points and describe methodology in the field logbook.

3.3 SCREENING FOR CHEMICALS

3.3.1 Field Screening

Although chemicals are not suspected contaminants of concern, it has been requested that a minimum of four samples from the cribs be field screened for chemical analysis. If the field screening samples indicate the presence of chemical concentrations, the samples will be sent to an offsite laboratory for confirmation. The data will be used to correlate field screening for chemicals with laboratory results.

The four samples will be collected from the excavation in the second, third, or fourth lifts. The samples will be chosen from an area exhibiting radiation contamination, as an indicator of potential chemical contamination.

The field screening will look for metals using portable XRF (metals screened for are chrome, lead, arsenic, zinc, cadmium, and copper), and an additional test will be conducted on the soil for Cr(VI) using a colorimetric method.

3.3.2 Clean Spoil Pile Soil Characterization Sampling

Soil sampling will be conducted at the clean spoil pile to ensure that the soil set aside as clean material meet the applicable requirements for use as clean fill. A sample will be collected from the spoil pile or backhoe bucket to represent each lift. These 12 samples will undergo EPA Contract Laboratory Program (CLP) chemical and radioisotope analyses.

Soil samples will correspond to clean soil backhoe scoops taken from the near edge of the waste plume. This will ensure that the rest of the soil in the pile does not exceed background levels for the 100 Area, as defined by the Hanford Site Background Document (DOE-RL 1993b).

3.3.3 Verification Sampling

In order to ensure that the excavation removed all contamination from the crib, verification samples from the bottom of the crib will be taken. A minimum of four verification samples will be taken and a full suite CLP and radiological analysis will be run. One sample will be taken from each of the side slopes, and two samples will be taken from the bottom of the crib.

3.4 DUST CONTROL SURVEYS AND SAMPLE COLLECTION

Dust control procedures are provided in Appendix B. This section of the sampling plan concentrates on the collection of air and soil samples.

3.4.1 Air Samplers

A total of seven low-volume air samplers will be used during this test as discussed in the Treatability Test Plan (DOE-RL 1993a). The samplers will be placed as indicated in Table CT-3 and Figure CF-3. The location of the air samplers will be adjusted in the field based on wind direction data collected from the meteorological station. A site map will be completed at the beginning of the test and each time the samplers are adjusted to record the sampler positions.

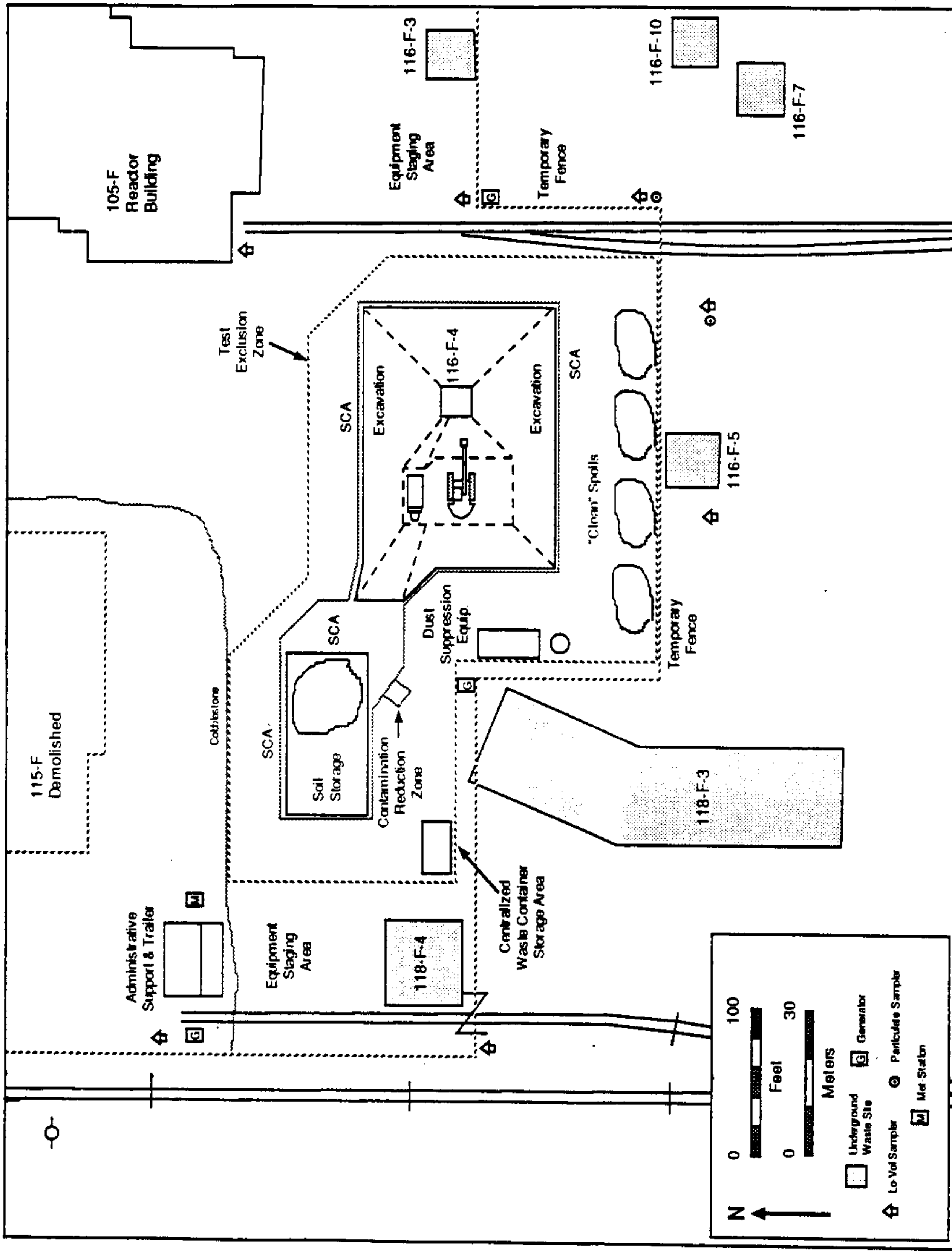
Table CT-3. Placement of Air Samplers.

Placed in the direction of:	Number
Principal Seasonal Wind	1
Secondary Seasonal Wind	1
Cross Winds (both directions)	2
Additional Samplers	3

Air sampler filter papers will be collected at the beginning and end of the work day and once during the weekend. This sampling methodology results in 77 dust samples per week (14 per work day and 7 per weekend).

The air samplers utilize an electric-powered vacuum pump drawing air through a preweighed filter. The filters are removed from the sampler, placed in a clean bag that is labeled, and placed in an envelope. The air samplers will be located on a site map and given unique designations. The filters collected from each sampler will be labeled with the sampler designation and a unique sample number. The sample log will note the sample number, time period elapsed, air flow volume, and hand-held radiation screening results. Samplers shall be operated per WHC-IP-0692, Section 11.09.02, "Environmental Ambient Air Sampling" (WHC 1990). Environmental Protection shall operate the air samplers.

Figure CF-3. Location of Air Samplers.



3.4.2 Real-Time Air Monitoring

During the working day, the real-time air monitoring will be performed every 2 h. Real-time air readings will not be obtained in the excavation, but will be located around the perimeter of the excavation.

A second program of real-time air monitoring will be followed at the completion of the work day, as described in the test plan. Real-time dust measurements will be taken 1 h after all dust suppression measures have been completed for the work day. A second set of real-time dust measurements will be obtained 2 h after the end of the work day, and a third set of real-time dust measurements will be obtained 3 h after the end of the work day.

The locations for the real-time total dust air monitoring will be based on the daily wind directions and will be indicated on a site map daily, and included in a field logbook. The monitoring points will be taken in the order to form a circuit around the excavation. Prior to the start of the circuit, wind direction will be established. The locations of the monitoring points will be determined by the sample technician so that the samples are obtained both upwind and downwind of the area/dust source of interest. The upwind points are important to determine the amount of dust entering the site and what effect the nearby buildings are having on wind patterns (i.e., shedding of vortices may cause significant turbulence upwind of the site). In order to accurately record the reading locations, a standard site map will be prepared, and a map showing actual monitoring locations will be completed for each sampling circuit.

Real-time air monitoring will consist of noting readings from the meter. Readings will be obtained at the designed locations and will be noted on the data sheet. To record the actual locations of the sample readings, the reading locations will be marked on a site map for each circuit, with the sample designations also noted beside the location marker. The readings will be recorded on a master sample log.

3.4.3 Personal Air Samplers

Personal air samplers will be worn by the backhoe operators and the sample technicians working in the exclusion zone. New filters will be installed at the start of each work day and collected at the end of the work day per approved Hanford Environmental Health Foundation (HEHF) procedures and protocol.

HEHF shall have the responsibility of operating, controlling, and analyzing the personal air samplers.

3.4.4 Soil Moisture Content

Soil moisture samples will be taken from the 12 locations each lift, in locations the same as the field rad surveys on the perpendicular grid and also will be taken from the spoil piles daily. This sampling program will result in approximately 200 to 250 moisture content samples collected during the entire test program, and a larger number of samples may be collected as determined by the field team leader.

Moisture content samples will be obtained by collecting approximately 200 to 300 g of representative soil in a preweighed aluminum moisture container. The container should not be filled completely, so as to avoid contamination spread when the containers are opened in the laboratory. The lid should be placed on the container securely, and shall be secured with 1-in. plastic tape around the edges of the lid.

The container will be labeled with the unique sample number, which will indicate the location of the sample, date, and sample number. The sample log will indicate the sample number, sample location, the lift it was obtained from, whether the sample was obtained at the end of an excavation lift or following application of a dust suppression measure, and other relevant information.

3.4.5 Meteorological Station

The meteorological station will be located in the support zone as close to the work area as practical. The meteorological station will provide data on wind speed, wind direction, temperature, relative humidity, and barometric pressure. The data will be recorded hourly by field personnel and recorded on the meteorological data sheets for the duration of the test program. The meteorological station will be set up, calibrated, and operated 1 week prior to the start of the test program to obtain 1 week of wind speed and wind direction data prior to the start of the test program.

4.0 SAMPLE COLLECTION, HANDLING, AND LABELING

Following collection, samples shall be controlled in accordance with the requirements outlined in EII 5.2, "Soil and Sediment Sampling" (WHC 1988). EII 5.2 provides general guidance for containers and preservation requirements. The contractor laboratory may request modifications to these recommendations as long as the quality of the data is not compromised. Sample containers are purchased precleaned from a supplier providing certification of internal laboratory procedures. All soil samples shall be labeled, sealed, and placed in a container for preservation on ice or other appropriate cooling medium.

HEIS is used to track the sample and laboratory data obtained during environmental investigations conducted under this description of work. Each soil sample shall be identified and labeled with a unique HEIS sample number. HEIS numbers shall be assigned in the field per EII 5.10 (WHC 1988). The sample location and corresponding HEIS numbers shall be documented in the field logbook.

4.1 FIELD LOGBOOKS

Field activities shall be recorded in a field logbook according to the protocols outlined in EII 1.5, "Field Logbooks" (WHC 1988). Entries shall be made in ink, signed, and dated.

4.2 CHAIN OF CUSTODY

Chain-of-custody records shall be maintained in accordance with the requirements of EII 5.1, "Chain-of-Custody" (WHC 1988). The chain-of-custody form shall ensure the traceability of the sample from time of collection until disposal.

4.3 SAMPLE ANALYSIS REQUEST

An approved laboratory shall be used to conduct laboratory analyses. The request for appropriate analyses shall be included on the WHC sample analysis request form as provided in EII 5.2, "Soil and Sediment Sampling." Laboratory specific forms may be utilized in lieu of the WHC form and shall be made available by the Hanford Analytical Sample Management Organization (HASM).

4.4 DECONTAMINATION

Hand-held equipment used for the direct collection of samples shall have been previously cleaned in accordance with EII 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling." Cleaning of backhoe equipment in the field shall follow the requirements outlined in EII 5.4, "Field Decontamination of Drilling, Well Equipment, and Sampling Equipment." All associated activities shall be recorded in the field logbook.

4.5 SHIPPING

Shipping requirements shall conform with EII 5.11, "Sampling Packaging and Shipping" (WHC 1988).

5.0 WASTE HANDLING

Waste materials associated with sampling will be composed mainly of used personal protective equipment and packaging materials and shall be handled in accordance as described in Appendix B and the regulator-approved Waste Control Plan. Materials that have not contacted the potentially contaminated soil shall be segregated from the contaminated materials.

Potentially contaminated items shall be placed in reinforced polyethylene bags and sealed with tape. Each bag shall be labeled with the sample number associated with the sample location and shall be placed in a drum for storage at the site until the soil samples are analyzed. The drums shall be given a unique tracking number and shall be labelled with an Interim Control of Unknown, Suspected Hazardous Waste Form (IC Form).

The material will be designated for waste disposal per the sample analysis results, using the worst-case sample results for each drum's contents. Drums will remain at the site in accordance with the IDW waste control plan.

Excavated soil will be handled per the waste control plan for this project.

6.0 SAMPLE ANALYSES

6.1 RADIOLOGICAL AND CHEMICAL SAMPLES

Samples analyzed for chemical constituents shall be analyzed using the current CERCLA CLP methods for organic compounds and inorganic analytes.

Contract-approved methods shall be used for selected radiological analyses (Level V). Radiological analyses shall include the isotopes and detection limits shown in Table CT-4.

Table CT-4. Radionuclides Sample Analysis.

Radionuclides	Minimum detection limits (pCi/g)
^{241}Am	20
^{152}Eu	3
^{154}Eu	3
^{155}Eu	100
^{60}Co	1
^{137}Cs	3
$^{239/240}Pu$	75
^{90}Sr	13
^{99}Tc	1750
^{235}U	15
^{238}U	50

The analytical results must meet these detection limits as a minimum. The laboratory has been requested to provide detection limits at 1/10th of these values.

The soil samples collected from the clean spoil piles and the excavation verification samples will be analyzed to verify that the soil is clean and suitable for free release. The analyses required for these samples are presented in Table CT-5.

Table CT-5. Hazardous Material Sample Analyses.

Parameters of interest	Analytical method (TMA/Weston)	Target detection limit	Precision (soil)	Accuracy (soil)
ALL SAMPLES				
TAL Metals	CLP	CRDL[a]	±35%	75-125
Nitrite/Nitrate	EPA 353.2	1.25 mg/kg	±35%	75-125
Anions: fluoride sulfate chloride phosphate	EPA 300	2.5 mg/kg 1.25 mg/kg 1.25 mg/kg 1.25 mg/kg	±35%	75-125
Total activity	LA-548-111 LA-508-121	50 pCi/g		
Volatile organics	CLP	CRDL[a]	b	b
Semivolatile organics	CLP	CRDL[a]	b	b

[a]For all CLP analytical categories, CRDL refers to the Contract Required Detection Limit specified in the CLP Statements of Work (EPA 1990a, 1990b).

[b]Precision and accuracy as defined in the CLP Statements of Work (EPA 1990a, 1990b).

6.2 DUST CONTROL SAMPLE ANALYSIS

6.2.1 Air Samplers

Immediately following collection, the filters will be screened for radiation by the HPT using hand-held equipment. Filter papers will be transferred to the Geotechnical Engineering Laboratory at the 377 Building in the 300 Area. The filters will be weighed to obtain the total weight of material retained during the time of exposure (gravimetric analysis, EPA 1975). The laboratory analytical report will provide the amount of dust collected on the filter as micrograms. The volume of air drawn through the filter over the sampling period is recorded for each sample using the air sampler totalizer. The total weight of the dust retained on the filter is divided by the volume of air in the sample to obtain results expressed as micrograms per cubic meter.

6.2.2 Real-Time Air Monitoring

Real-time air monitoring will be performed according to the manufacturer's directions for use, and the results will be noted on the sample log for correlation with the field activity logs and other data.

6.2.3 Personal Air Samplers

Personal air sampling will be conducted by HEHF. Samples will be handled and analyzed in accordance with approved HEHF protocol.

6.2.4 Moisture Content

Following collection in the field, the soil moisture content samples will be logged, labeled, and transferred to the Geotechnical Engineering Laboratory at the 377 Building in the 300 Area. The soil moisture content will be measured in the sample according to the procedures described in WHC-IP-0635, Vol. 1, Section GEL-14, "Soil Moisture Determination" (WHC 1991).

7.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance (QA) and quality control (QC) of sample analysis and results shall be ensured by concomitant field and laboratory procedures. Procurement of laboratory services shall be the responsibility of HASM, which shall ensure through the requirements outlined in EII 1.11, "Technical Data Management," that contractor laboratories shall meet minimum QA/QC requirements. HASM is also responsible for the review of all laboratory QA/QC programs and records and providing "validated" data to the project engineer (WHC 1988, EII 1.11).

7.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL

To ensure QA/QC measuring that provides consistent guidance in field work, a set of procedures designated as EII have been developed by WHC (1988). The EII that may be utilized, but not limited to, in this effort follow:

Task	EII
Sampling Procedures	5.2
Sample Handling	5.2, 5.11
Field Documentation	1.5, 5.1, 5.10
Equipment Decontamination	5.4, 5.5
Field Screening	3.4
Site Entry Requirements	1.1
Deviation from Procedures (EII)	1.4
Personnel Requirements	1.1, 1.7
Health and Safety Requirements	1.1, 1.7, 3.2

7.2 SAMPLE QUALITY ASSURANCE/QUALITY CONTROL

Documentation will be provided by entries into the field logbook as per EII 1.5. The number of QA samples will conform to one equipment blank, one duplicate, and one split per every 20 soil samples at a minimum. These samples shall allow comparisons with crib sample values and an ancillary evaluation of laboratory quality. Additional QA samples may be acquired at the discretion of the field team leader. The medium utilized for the equipment blank shall be silica sand. The trip blank and field blank have been deleted in accordance with OSWER Directive 9355.0-7B, Appendix C, Section C.6 (p. 13).

8.0 SAMPLING PLAN MODIFICATIONS

Under field conditions, the optimal aspects of preliminary sample design often are not achievable. Factors influencing these efforts can be equipment malfunction or breakdown, weather conditions, improper equipment, soil conditions, physical barriers to sampling equipment, and overly optimistic evaluation of capabilities. Because of unforeseen field conditions, modifications to the planned activity may be necessary as decided by the field team leader.

To ensure efficient and timely completion of tasks, minor field changes can be made by the person in charge of the particular activity in the field. Minor field changes are those that have no adverse effects on the technical adequacy of the job or the work schedule. Such changes shall be documented in the daily logbooks that are maintained in the field. If it is anticipated that a field change shall affect the agreed to work schedule or requires the approval of the lead regulatory agency, the applicable DOE unit manager will then be notified.

9.0 REFERENCES

DOE-RL, 1993a, *100 Area Excavation Treatability Test Plan*, DOE/RL-93-04, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1993b, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1975, *Quality Assurance Handbook for Air Pollution Measurement Systems*, EPA/600/7-77/027A, U.S. Environmental Protection Agency, Cincinnati, Ohio.

EPA, 1990a, *USEPA Contract Laboratory Program Statement of Work for Organic Analysis*, Sample Management Office, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990b, *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*, Sample Management Office, U.S. Environmental Protection Agency, Washington, D.C.

WHC, 1988, *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Health Physics Procedures Manual*, WHC-IP-0692, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991, *Geotechnical Engineering Procedures Manual*, WHC-IP-0635, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993, *WHC Radiological Control Manual*, WHC-CM-1-6, Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT C1

QUALITY ASSURANCE PROJECT PLAN

1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) describes the quality assurance requirements that support the 100 Area Excavation Treatability Study characterization activities. This QAPP presents the objectives, organizations, functional activities, procedures, and specific quality assurance (QA), and quality control (QC) protocols associated with these activities.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

QAPP responsibilities of key personnel and organizations are:

- **Field Team Leader (Environmental Restoration Engineering).** Responsible for onsite direction of the sampling team in compliance with the requirements of this QAPP, the sampling plan, and all implementing Environmental Investigation Instructions (EII).

- **Cognizant Quality Assurance Engineer (Environmental Quality Assurance).** The QA person is responsible for performing formal audits/surveillances to ensure compliance with QAPP requirements (WHC 1990).

- **Hanford Analytical Sample Management (HASM)** is responsible for coordinating qualified and approved laboratory support for all project analyses concerns, assisting in sample shipment tracking, resolving chain-of-custody issues, and when requested validating all related data.

- **Qualified Analytical Laboratories.** Soil samples shall be sent to a Westinghouse Hanford Company (WHC) approved contractor, participant subcontractor, or subcontractor laboratory. They shall be responsible for performing the analyses identified in this plan in compliance with work order, contractual requirements, and WHC approved procedures (see Section 5.0). Each laboratory shall have and comply with a written approved laboratory QA plan. All analytical laboratory work shall be subject to the surveillance controls invoked by QI 7.3, "Source Surveillance and Inspection." This plan shall meet the appropriate requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989). HASM shall retain prime responsibility for ensuring acceptability of offsite laboratory activities.

- **Other Support Contractors.** The project engineer may assign project responsibilities to other support contractors project responsibilities. Such services shall be in compliance with standard WHC procurement procedures as discussed in Section 5.0. All work shall comply with WHC approved QA plans and/or procedures.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

The QAPP's principal objective is to maintain the quality of field activities, sample handling, laboratory analysis, and to document each processing level.

The EPA devised an analytical level classification system (EPA 1987) that provides increased data quality as the scale increases. Level I consists of field screening methods. Level II entails more advanced onsite analytical techniques. Level III concerns standard laboratory program procedures. Level IV consists of EPA Contract Laboratory Program procedures. Level V addresses specially developed procedures where standard methods are not available or require a high degree of analytical sensitivity.

WHC developed a site-specific analytical classification that fulfills the EPA data quality goals. It consists of two data quality levels: field or laboratory screening and validated laboratory analyses (McCain and Johnson 1990). Field or laboratory screening is equal to EPA Levels I, II, and III. Validated laboratory analyses are equal to EPA Levels IV and V.

The sampling plan list analytes of interest along with precision and accuracy requirements.

4.0 SAMPLING PROCEDURES

Sampling activities shall be consistent with the current applicable WHC (1988) procedures and the sampling plan. These procedures are identified in the project field sampling plan. They include:

- EII 1.4, "Instruction Change Authorizations"
- EII 1.5, "Field Logbooks"
- EII 1.6, "QA Records Processing"
- EII 1.7, "Indoctrination, Training, and Qualification"
- EII 3.4, "Field Screening"
- EII 5.1, "Chain of Custody"
- EII 5.2, "Soil and Sediment Sampling"
- EII 5.5, "1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment"
- EII 5.11, "Sample Packaging and Shipping."

As noted in Chapter 3, procured participant contractor and/or subcontractor services shall be subject to the following (WHC 1989):

- QI 4.0, "Procurement Document Control"
- QI 4.1, "Procurement Document Control"
- QI 4.2, "External Services Control"
- QI 7.0, "Control of Purchased Items and Services"
- QI 7.1, "Procurement Planning and Control"
- QI 7.2, "Supplier Evaluation"
- QI 7.3, "Source Surveillance and Inspection"
- QI 17.0, "Quality Assurance Records"

- QI 17.1, "Quality Assurance Records Control"
- EII 1.6, "QA Records Processing" (WHC 1988).

The procurement document shall specify that the contractor submit for WHC review and approval prior to use all analytical procedures and its QA/QC program. Participant contractor or subcontractor procedures, plans, and/or manuals shall be retained as project quality records.

5.0 SAMPLE CUSTODY

Project samples shall be controlled per EII 5.1, "Chain of Custody," from the point of origin to the analytical laboratory. Laboratory chain-of-custody procedures shall be reviewed and approved as required by WHC procurement control procedures as noted in Chapter 4. The contractor shall ensure the maintenance of sample integrity and identification throughout the analytical process. Offsite sample tracking shall be performed by HASM procedure, "Sample Tracking."

Results of analyses shall be traceable to original samples through a unique code or identifier. WHC shall assign the samples Hanford Environmental Information System (HEIS) sample numbers. All results of analyses shall be controlled as permanent project quality records.

6.0 CALIBRATION PROCEDURES

Calibration of critical WHC measuring and test equipment, whether in existing inventory or newly purchased, shall be controlled as required by:

- QR 12.0, "Control of Measuring and Test Equipment"
- QI 12.1, "Acquisition and Calibration of Portable Measuring and Test Equipment"
- QI 12.2, "Measuring and Test Equipment Calibration by User
- EII 3.1, "User Calibration of Health and Safety Measuring and Test Equipment."

Routine field equipment operational checks shall be per applicable EII or procedures. Similar information shall be provided in WHC-approved participant contractor or subcontractor procedures.

Participant contractor or subcontractor laboratory analytical equipment calibrations shall be per applicable standard analytical methods. These shall be subject to WHC review and approval.

7.0 ANALYTICAL PROCEDURES

Procedures based on the referenced methods shall be selected or developed, and approved before use in compliance with appropriate WHC procedure and/or procurement control requirements as noted in Chapter 4.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

8.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

All analytical laboratories shall be responsible for preparing a report summarizing the analysis results and a detailed data package. This includes all information necessary to perform data validation to the extent indicated by the minimum requirements of Section 8.2. Data shall be reported on a dry-weight basis. The data summary report format and data package content shall be defined in procurement documentation subject to WHC review and approval as noted in Chapter 4. As a minimum, laboratory data packages shall include the following:

- Sample receipt and tracking documentation, including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain-of-custody procedures, and the dates of sample receipt, extraction, and analysis

- Instrument calibration documentation, including equipment type, model, initial and continuing calibration data, method of detection limits, and calibration procedure used

- Additional quality control data, as appropriate for the methods used including matrix spikes, duplicates, recovery percentages, precision data, laboratory blank data, and identification of any nonconformance that may have affected the laboratory's measurement system during the analysis time period

- The analytical results or data deliverables, including reduce data, reduction formulas or algorithms, unique laboratory identifiers, and description of deficiencies

- Other supporting information, such as reconstructed ion chromatographs, spectrograms, traffic reports, and raw data.

Sample data shall be retained by the analytical laboratory and made available for systems or program audit purposes upon request by WHC, RL, or regulatory agency representatives. Such data shall be retained by the analytical laboratory through the duration of their contractual statement of work, at which point, it shall be turned over to WHC for archiving.

8.2 VALIDATION

The completed data package shall be reviewed and approved by the analytical laboratory's QA Manager before submittal to WHC for validation. Validation of the completed data package shall be performed by qualified HASM or other contract personnel. Validation requirements shall be defined within the approved procurement document or HASM data validation procedures (WHC 1992).

For analyses performed by qualified laboratories, validation reports shall be prepared. The results of these analyses shall be substantiated with checks as applicable per the analytical procedure.

8.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages shall be subjected to a final technical review by qualified reviewers at the direction of the WHC project engineer. This will be done before data submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with EII 1.6, "Records Management" (WHC 1988), and QA 17.0, "Quality Assurance Records" (WHC 1989). The project engineer will have the primary responsibility for dispositioning project related records and data.

9.0 INTERNAL QUALITY CONTROL

Sampling plan activities may be evaluated as part of the project's QC effort. All analytical samples shall be subject to in-process QC measures from the field to the laboratory and during laboratory processing. Laboratory analyses performance audits are implemented through the use of QA/QC samples sent to multiple laboratories. The data quality generated in this project will be operationally defined by the following internal QC sampling.

- Split samples shall be collected and submitted to separate laboratories for a measurement precision assessment
- Duplicate samples shall be collected and submitted to measure intralab precision
- Equipment blanks (matrix-silica sand) shall be prepared and submitted to assess sampling equipment cleanliness
- Laboratory internal quality control checks performed per applicable protocol for the analysis. For chemical analysis, this must include data demonstrating achieved accuracy, precision, system calibration, and performance. Reportables will include:
  - Preparation and calibration blanks
  - Calibration verification standards
  - Matrix spikes

- Duplicates
- Control samples
- Other supporting documentation.

The minimum requirements of this section shall be invoked in procurement documents or work orders, compliant with standard WHC procedures as noted in Chapter 4.

10.0 PERFORMANCE AND SYSTEMS AUDITS

Program activities are subject to oversight by WHC QA personnel. Audits may address quality-affecting activities that include, but are not limited to, measurement system accuracy, intramural and extramural analytical laboratory services, field activities, and data collection, processing, validation, reporting, and management. WHC QA audits shall be performed under the standard operating procedure requirements of WHC (1989).

System audit requirements are implemented in accordance with QI 10.4, "Surveillance." All quality-affecting activities are subject to surveillance. The project engineer shall interface with both the Environmental Field Services quality coordinator and the QA officer. The QA officer is responsible for providing independent formal audits/surveillances to ensure compliance with planned activities, and identify conditions adverse to or enhancing overall performance quality.

11.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratory that directly affect analytical data quality shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Field equipment maintenance instructions shall be as defined by the approved procedures governing their use. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment; maintenance requirements, spare parts lists, and instructions shall be included in individual methods or in laboratory QA plans, subject to WHC review and approval. When samples are analyzed using EPA reference methods, the preventive maintenance requirements for laboratory analytical equipment are as defined in the procured laboratory's QA plan(s).

12.0 DATA QUALITY INDICATORS

12.1 DATA ASSESSMENTS BY ANALYTICAL FACILITY

Adherence to approved procedures will be sufficient for the majority of data reports. To the extent possible, performance-based standards will be the preferred method of assessment for precision and accuracy measurements. A familiar example is the use of control charts. Values exceeding a 3-sigma limit on well-established and appropriate control chart should be flagged when reported. Samples in the analytical batch should be rerun if possible, and those results also reported.

When appropriate performance-based standards are not available and referenced procedures do not specify, the following two rules may be used.

- Precision--The difference between laboratory duplicates will be subject to a control limit of 150% of the requested limit whenever both sample values exceed the estimated method detection limit (MDL). If the estimated MDL exceeds the requested limit, the higher value may be used to calculate the control limit. When either or both duplicates are below the estimated method detection limit, laboratory precision may be assessed by comparing identically spiked samples. Samples exceeding five times the control limit can be subject to a 20% relative percent difference limit, where:

$$\text{Relative Percent Difference} = \frac{(S - D) \times 100}{((S+D)/2)}$$

  S = Sample concentration
  D = Duplicate sample concentration.

  Failure to meet a precision limit will require evaluation and corrective action as appropriate.
- Accuracy will be defined by percent recovery data where

$$\%\ \text{Recovery} = \frac{(\text{Spiked Sample Result} - \text{Sample Result})}{\text{Spike Added}} \times 100$$

  When the sample result (SR) is less than the MDL, use SR=0 for the purpose of calculating the percent recovery. Spiked samples having concentrations two to five times greater of the requested detection limit or MDL will have recovery control limits of 50% to 150%. Spiked samples exceeding five times the estimated MDL will have recovery control limits of 75% to 125%. Failure to meet the control limit will require evaluation and corrective action as appropriate. Applicable samples not meeting the limit should be rerun using a postdigestion spike if possible. Postdigestion spikes should be made at two times the indigenous level or lower reporting limit, whichever is greater.

12.2 PROJECT LEVEL ASSESSMENTS

All data requested through HASM will be subject to validation procedures as previously described (Section 8.2). Completeness of requested analyses will be assessed and reported to the project engineer by WHC HASM or subcontractor. The EPA guidance suggests 80% to 85% is a reasonable expectation (EPA 1987).

Summary statistics for measurement precision and accuracy shall be prepared in conjunction with the data analysis.

Precision evaluation at the project level will address interlaboratory precision. Precision of environmental measurement systems is often a function of concentration. This relationship should be considered before selecting the most appropriate form of summary statistic. Simplistically, this relationship can usually be classified as falling into one of the following three categories.

- Standard deviation (or range) is constant.
- Coefficient of variation (or relative range) is constant.
- Standard deviation (or range) and coefficient of variation (or relative range) vary with concentration.

The pooled standard deviation or pooled coefficient of variation can be used to summarize data in bullets 1 and 2, respectively. Bullet 3 will require either graphical summary of the data or specialized regression techniques.

Data quality assessments are generally made at concentrations typical of the observed range in routine analyses. In some situations, the typical value measurement will be below an estimated practical method, or instrument detection limit (i.e., an engineering zero). If a standard exists (or is to be set) at some positive finite value, quality assessment summaries may be desired at that level rather than the most representative concentration.

13.0 CORRECTIVE ACTIONS

Corrective action requests required as a result of surveillance reports, nonconformance reports, or audit activity shall be documented and dispositioned as required by QR 16.0, "Corrective Action;" QI 16.1, "Trending/Trend Analysis;" and QI 16.2, "Corrective Action Reporting" (WHC 1989). Primary responsibilities for corrective action resolution are assigned to the project engineer and the QA officer. Other measurement systems, procedures, or plan corrections that may be required as a result of routine review processes shall be resolved as required by governing procedures or shall be referred to the project engineer for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project QA records upon completion or closure.

14.0 QUALITY ASSURANCE PROJECT REPORTS

Special QA reports are not planned for this project. Project records will be maintained in conformance with standard operating procedure requirements of WHC (1988). Project records will be maintained according to EII 1.6, "QA Records Processing," and technical data will be dispositioned according to EII 1.11, "Technical Data Management." Surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project QA on completion or closure of the activity. The final project report shall include an assessment of the overall adequacy of the total measurement system with regard to the data quality objectives of the investigation.

15.0 REFERENCES

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, et seq., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities: Development Process*, EPA/540/6-87/003, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, U.S. Environmental Protection Agency, Washington, D.C.

McCain, R. G. and W. L. Johnson, 1990, *A Proposed Data Quality Strategy for Hanford Site Characterization*, WHC-SD-EN-AP-023, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989, *Westinghouse Hanford Company Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Data Validation Procedures for Radiological Analysis*, WHC-SD-EN-SP-002, Westinghouse Hanford Company, Richland, Washington.

9413201.1563

APPENDIX D

WASTE CONTROL PLAN

WASTE CONTROL PLAN REV 0

Work Scope Description: 100 Area Excavation Treatability Test

List Constitutents of Concern: Pu-239/240 Sr-90 Eu-152 Eu-154 Cs-137

Site Description: Southwest Corner within the F-Reactor Security Fence
See attached Map

Reference: DOE/RL-93-04, WHC-SD-EN-TC-004, Rev 0
Rev 1

Rev

Date Approved: August 1993

Preparer/ Project/RI Coordinator: J. M. Ayres (Print/Sign Name)

Date: 8/25/93

Safety Class: 4

Impact Level: 4

Field Team Leader/ Cognizant Engineer: D. B. Blumenkranz
J. M. Frain

IDW Coordinator: G. G. Hopkins

Planned Drilling Start and Finish Dates: From 9/13/93 To: 11/30/93

Waste Storage Facility ID Number(s): N/A

Field Screening Methods

Method	Frequency	Reference	Detection Range	Analyst
PAM	per RWP	WHC-CM-4-12, Sec 7	0-100,000 CPM	HPT
GM	per RWP	WHC-CM-4-12, Sec 7	0-100,000 CPM	HPT

Additional Field screening will be conducted to delineate the area of contamination prior to removing the soil from the excavation. Details of this field screening is provided in WHC-SD-EN-TC-004, Rev. 0

Laboratory Methods (constituents of concern)

Method	Frequency	Reference	Detection Limits	Contract Lab
See Attachment 2		WHC-SD-EN-TC-004		

APPROVALS (Print/Sign Name and Date)

G. G. Hopkins [signature] 8/25/93
IDW Coordinator

J. M. Ayres [signature] 8/25/93
Project/RI Coordinator

N/A
Safety Function (if required)

D. B. Blumenkranz [signature] 8/25/93
J. M. Frain [signature] 8/25/93
Field Team Leader/Cognizant Engineer

N/A
Quality Assurance (if required)

A-6000-903 (04/92)

9413201.1566

WASTE CONTROL PLAN

Drill Site Coordinate Location N/A

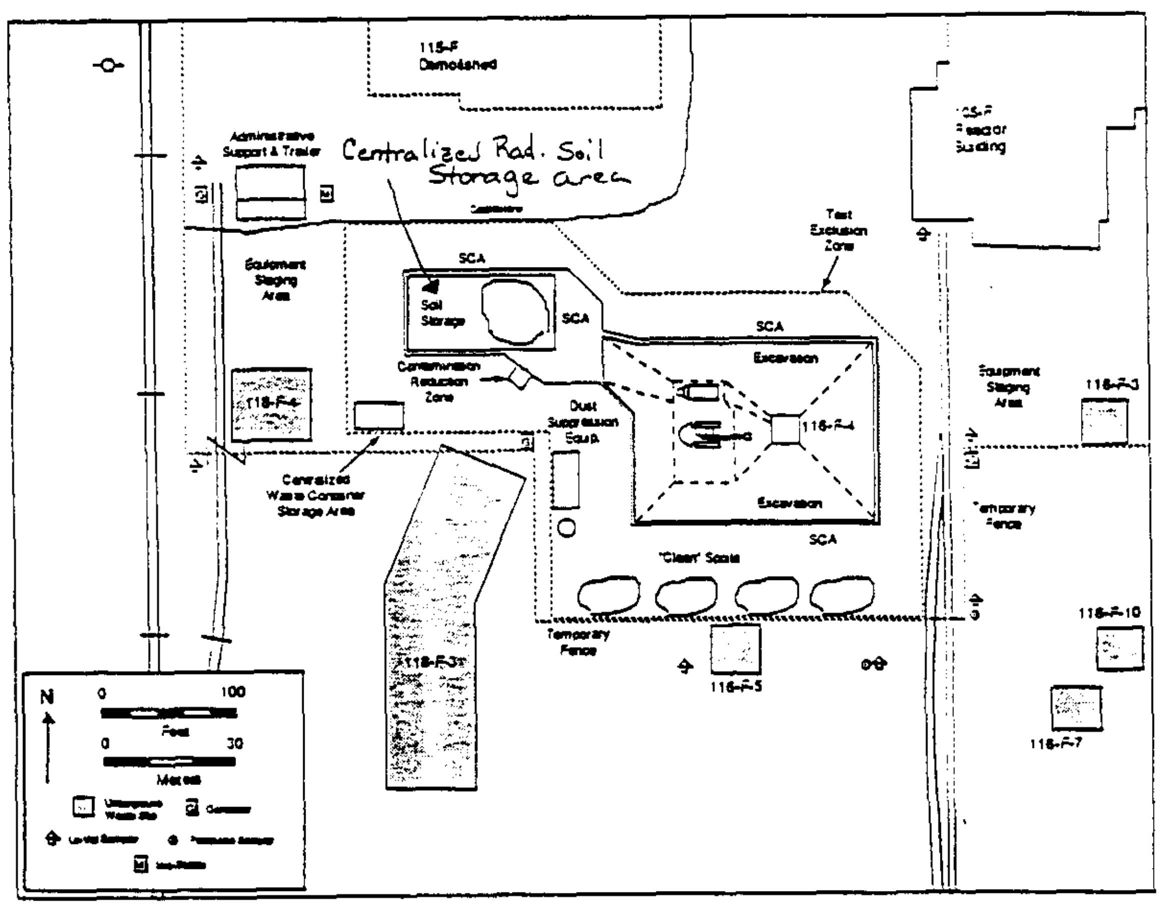
Waste Container Storage Area(s) Coordinate Location(s) See Map Below

Requirements for Soil Pile Sampling (if any) Discussed in attached text.

Nonregulated Material Disposal Location(s) Paper, plastics, etc. will be disposed of at the Central Landfill. Non-regulated soil will be returned to the excavation as described in attached plan.

9413201.1567

SKETCH OF WORK SITE



APPROVALS (Print/Sign Name and Date)

Lead Regulatory Agency Representative

Pamela ... 8/20/93

DOE-RL 8/25/93

Project/RI Coordinator 8/25/93

A-6000-903R (04/92)

1.0 INTRODUCTION

This plan presents the methods to be followed in controlling wastes generated during field activities associated with the 100 Area Excavation Treatability Test. Field investigation activities are described in *100 Area Excavation Treatability Test Plan* (DOE-RL 1993). The sampling activities at the 116-F-4 (F Area Pluto Crib)include the following:

- Characterizing extent of underground contamination with the cone penetrometer (CPT) and the appropriate detector
- Excavating contaminated soils from the waste site using a backhoe
- Screening the crib soil (in situ) for radionuclide contamination with a multitude of detectors
- Field screening for metals using XRF to compare with background, further field screening for chromium using colorimetric methods
- Segregating contaminated and clean soils
- Confirmational sampling of crib soils and spoils piles for data correlation
- Testing a variety of dust suppression techniques
- Particulate sampling using a variety of sampling methods.

2.0 SCOPE

This treatability test does not involve treatment of contaminated material; therefore, the only residual products from the test are potentially contaminated CPT equipment, the soil excavated from the site, and protective clothing and other materials contaminated by the soil. The soil may contain small amounts of dust suppressants and fixants used during excavation. Suppressants and fixants include water, water with surfactants, and crusting agents. The soil that is radiologically contaminated will remain in the contaminated soil storage unit on the test site until needed for future processing.

This waste control plan applies to all wastes generated during test activities. The bulk of the waste will be the contaminated soil excavated during the test and stored on site. Paper, gloves and related sampler's waste, as well as tape, plastic, and disposable personal protective equipment is expected to make up additional waste.

All waste derived from test activities will be subject to handling in compliance with procedures in the *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Section 4.0, "Waste Management" (WHC 1988), and *Solid Waste Management*, WHC-CM-5-16 (WHC 1991).

3.0 FIELD DESIGNATION/HANDLING OF WASTES

The western side of the exclusion are is the designated Centralized Waste Container Storage Area for the 100 Area Excavation Treatability Test. Exclusion zone barricades, proper postings, and the reactor exclusion fence will be sufficient to isolate the storage area from other personnel on the Hanford Site. A second area has been set up to hold the radioctively contaminated soil, and will be referred to as the Centralized Radioactive Contaminated Soil Storage Area.

3.1 CPT CHARACTERIZATION DERIVED WASTE

Crib penetration with the CPT will be conducted over sheet plastic. Should a spill of hydraulic fluid occur, the plastic sheeting will be used with available adsorbents to contain the fluids. The plastic sheeting, absorbent, and fluid will be disposed of in a plastic bag in a 8-gal drum. The appropriate labeling will be applied to the drum and the drum will be stored at the Centralized Waste Container Storage Area to await waste disposition. A spill of hydraulic fluid is unlikely, but should it occur, Environmental Compliance will be notified of the event and the proper documentation will be submitted. Waste will be handled in accordance with the applicable sections of WHC-CM-7-7, EII 4.3 (WHC 1988).

Waste associated with the CPT characterization of the crib will consist of potentially contaminated steel piping (from the probe) and miscellaneous waste (chem wipe towels, small amounts of soil). Unless released unconditionally, waste will be stored in the appropriate container at the Centralized Waste Container Storage Area. It will receive the proper labeling and documentation. Waste will be handled in accordance with the applicable sections of WHC-CM-7-7, EII 4.3 (WHC 1988), and WHC-CM-5-16, Section 2 (WHC 1991).

3.2 SOIL STORAGE UNIT

Soils recovered during the excavation that have been identified by field screening and other field instrumentation as contaminated (regulated) will be segregated from noncontaminated soils and placed within the Centralized Radioactive Contaminated Soil Storage Area. Contaminated soils will be stored in a TerraStor (a trademark of ModuTank, Inc.) soils storage unit located at the western side of the exclusion area. During periods of activity, efforts will be taken to ensure the entrainment of contaminated soils in the wind does not occur. Waste will be handled in accordance with this plan, the applicable sections of WHC-CM-7-7, EII 4.3, and WHC-CM-5-16, Section 2.

The storage unit will consist of 2-ft-tall side panels, braced at a 60° angle. The panels will frame a 50- by 100-ft area. The panels will be anchored with 100-lb sand bags and clean borrow soil (used as fill material between the bags and the panels). Contaminated soils will be piled within the framed area, on top of 20-mil PVC with an underlying 100-mil geo textile. The 20-mil PVC and geo textile will cover the area directly underneath the soils as well as the frame. Seams within the PVC will be welded together at the factory, prior to use. This will form an impermeable barrier under the soils, over the entire area occupied by the TerraStor unit.

At the end of each working day, crusting agents will be applied to the soils and soils within the storage unit will be covered. The temporary cover will be replaced following completion of excavation activities with a 30-mil laminated plastic sheet. The cover will be of sufficient size to enable the entire storage unit to be covered. An extra 3 ft of 30-mil sheeting will extend beyond the limits of the storage unit. Sand bags will be piled on the sheeting to form a continuous anchor around the cover.

The storage unit will be in place up to 2 years, until the soil is used in a soil-washing demonstration. The unit will be labelled as radioactive waste per EII 4.3. The unit will be inspected monthly to ensure that no contaminated soil is released to the environment.

The unit has been designed to prevent moisture from entering. The cover is 30 mil thick, and the soil underneath will be sloped to allow precipitation to run off. The unit is not double lined and has not been designed with a leachate detection system. All efforts are being taken to prevent rain/snow from entering. Monthly inspections will check for integrity of the cover and any signs of damage to the unit. If any damage is noted, the unit will be repaired immediately. If releases to the environment are evident or suspected, notifications will be handled as directed by EII 4.3, Section 6.8.

3.3 NONCONTAMINATED SOILS

Soils recovered during the excavation that have been identified by field screening and other field instrumentation as noncontaminated (nonregulated) will be segregated from contaminated soils. Noncontaminated soil will be staged on a heavy plastic liner near the excavation. The soils will be sampled for laboratory analysis to confirm that radionuclides within the soil are below accessible soil concentration standards. Upon completion of the treatability test and laboratory analysis, the soil that is identified as noncontaminated will be returned to the excavation as backfill.

3.4 MISCELLANEOUS WASTE

Miscellaneous waste will be generated during soil sampling activities within the excavation. Miscellaneous waste will include such items as aluminum foil, rubber gloves, and masking tape. This waste will be considered suspect low-level waste due to the possibility of becoming contaminated during sampling activities. Upon exiting the exclusion area, the sample technician and health physics technician will work together to segregate wastes in a plastic bag at the inner edge (outer edge of exclusion zone) of the contamination reduction zone. If practical, the bagged waste will be contained within a 55-gal drum. At the end of each working day, the drum will be secured. The appropriate drum label will be visible on the exterior of the drum. The drum will be stored at the Centralized Waste Container Storage Area. Solid Waste Acceptance Services will assign a hazard identification to the contaminated soil/waste. Final disposition of the waste will be determined jointly by the U.S. Environmental Protection Agency (EPA), State of Washington Department of Ecology and the U.S. Department of Energy, Richland Operations Office. The decision for final disposition of the remaining waste will be made by the EPA. Applicable procedures include WHC-CM-7-7, EII 4.3 (WHC 1988).

REFERENCES

DOE/RL, 1993, *100 Area Excavation Treatability Test Plan*, DOE/RL-93-04, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WHC, 1988, *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991, *Solid Waste Management*, WHC-CM-5-16, Westinghouse Hanford Company, Richland, Washington.

Attachment 2: Soil Sample Analysis

The spoil piles will be sampled such that one sample is taken to represent each 2 foot lift removed from the excavation. Contract-approved methods shall be used for selected radiological analyses (Level V). Radiological analyses shall include the isotopes and detection limits shown in Table 1. Hazardous Material Sample Analyses are shown in Table 2.

Table 1. Radionuclides Sample Analysis.

Radionuclides	Minimum detection limits (pCi/g)
^{241}Am	20
^{152}Eu	3
^{154}Eu	3
^{155}Eu	100
^{60}Co	1
^{137}Cs	3
$^{239/240}Pu$	75
^{90}Sr	13
^{99}Tc	1750
^{235}U	15
^{238}U	50

Table 2. Hazardous Material Sample Analyses.

Parameters of interest	Analytical method (TMA/Weston)	Target detection limit	Precision (soil)	Accuracy (soil)
ALL SAMPLES				
TAL Metals	CLP	CRDL[a]	±35%	75-125
Nitrite/Nitrate	EPA 353.2	1.25 mg/kg	±35%	75-125
Anions: fluoride sulfate chloride phosphate	EPA 300	2.5 mg/kg 1.25 mg/kg 1.25 mg/kg 1.25 mg/kg	±35%	75-125
Total activity	LA-548-111 LA-508-121	50 pCi/g		
Volatile organics	CLP	CRDL[a]	b	b
Semivolatile organics	CLP	CRDL[a]	b	b

[a]For all CLP analytical categories, CRDL refers to the Contract Requird Detection Limit specified in the CLP Statements of Work

[b]Precision and accuracy as defined in the CLP Statement of Work

THIS PAGE INTENTIONALLY
LEFT BLANK